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ALASKAN GLACIERS IN RELATION TO LIFE

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(Map facing p. 818.)

Introduction. In this paper some of the geographical aspects of the present and the former Alaskan glaciers are briefly presented, including their functions (a) as barriers to communication, (b) highways for natives, prospectors, geologists, and mountain climbers, (c) barriers to railroads, (d) sources of ice supply, (e) sources of water supply for mining, (f) in relation to placer gold, (g) as obstacles to coal and copper mining and transportation, (h) controls of plant and animal life, (i) modifiers of climate, (j) causes of unnavigable streams and producers of water power, (k) effects in modifying lake and fiord highways, and (l) in making or destroying harbors and town sites.

This paper is based, in part, upon field work in Alaska for the U. S. Geological Survey in 1904, for the American Geographical Society of New York in 1905, and for the National Geographic Society of Washington in 1909, 1910, and 1911; but largely upon the published accounts of the men whose splendid pioneer journeys are here mentioned.

Glaciers as Barriers to Communication. A mountain and glacier barrier extends along the Alaskan coast (Fig. 1). On the seaward side of the lofty Pacific ranges, the ocean winds cause heavy precipitation, the mountains have heavy snowfall (Fig. 2) and glaciers fill the passes. In spite of low passes, therefore, the mountain barrier is one of the most effective in the world, and it partly

isolates the interior of Alaska, which contains mineral wealth that people have eagerly tried to reach.

There are three feasible routes to the interior of Alaska. That by the White Pass and upper Yukon is not only difficult, but has

150°
146°
142°
66°
64°
62°
60°
ARCTIC
Alaska Range
Mt. McKinley
Yukon R.
Tanana R.
Fairbanks
Valdez
Copper R.
Wrangell Mts.
Mt. Wrangell
Mt. Sanford
Mt. Drum
Mt. Bona
Mt. Cook
Mt. Logan
Mt. St. Elias
Mt. Vancouver
Mt. Fairweather
Yakutat Bay
Malaspina Glacier
Kenai Mts.
Kenai Lake
Kenai R.
Kodiak I.
Kaliak I.
Afognak I.
Shelikof Str.
Cook Inlet
Kamishak Bay
Iliamna Lake
Lake Clark
Katmai
Mt. Katmai
Mt. Douglas
Mt. Redoubt
Mt. Iliamna
Mt. Spurr
Mt. Gordon Lyon
Mt. Marcus Baker
Mt. Campbell
Mt. Hayes
Mt. Deborah
Mt. Hubbard
Mt. Blackburn
Mt. Sanford
Mt. Wrangell

most suitable for travel being the through glaciers; but here, as in other lofty mountain regions, those glaciers which head in cirques or in high mountain valleys are barriers to travel.

Early Glacier Highways.[1] How much glaciers were used as highways by Alaskan aborigines is not known. The natives seem to dread the ice, no doubt because of unhappy experiences upon it. Nevertheless they have traveled across the glaciers when necessary, for example, across part of Muir Glacier from Glacier Bay to Lynn Canal, across the glaciers of the Fairweather Range from the Pacific

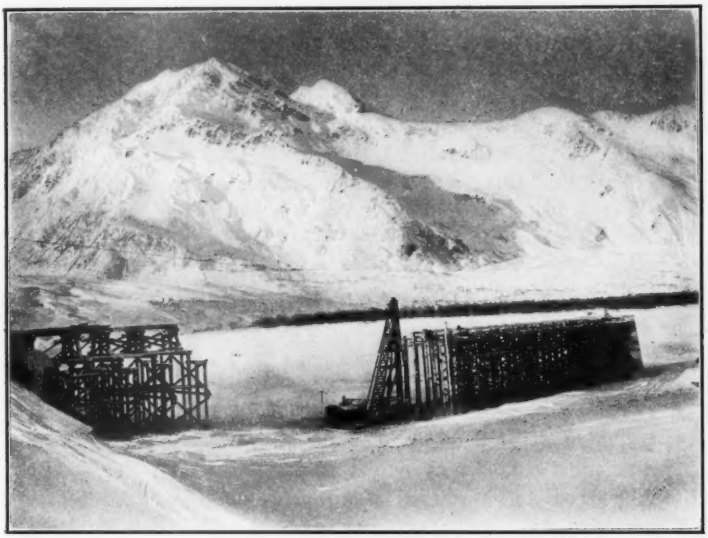

FIG. 2—The heavy snowfall on the coast ranges of Alaska. View near Childs Glacier.

Coast near Lituya Bay to Glacier Bay, over a glacier northeast of Chilkat Pass, over glaciers in southeastern Alaska near Taku Inlet, and southeast of Sumdum and over a portion of Bering Glacier. There are also rumors of glacier travel by the natives in the region between Yakutat Bay and the Alsek River and from Prince William Sound to the Copper River valley.

The Russians seem also to have traveled over the ice, for Captain Abercrombie, U. S. A., in 1884, and the prospectors who reached

[1] Glacier Highways in Alaska were described by the author before the Association of American Geographers, Chicago, December, 1907.

the head of Port Valdez in 1898 heard rumors of a Russian route over the ice to the Copper River in the middle of the last century. In 1880 Petroff went across the Portage Glacier, from Passage Canal in Prince William Sound to Turnagain Arm of Cook Inlet.

Glaciers as Highways for Mountain Climbers. The use of Alaskan glaciers as highways by mountain climbers begins with the attempts to ascend Mt. St. Elias. The Malaspina and some of its tributaries were thus utilized by Schwatka, Libbey, and Seton Karr in 1886, by the Tophams and Broke in 1888, by Russell in 1890 and 1891, and by Bryant and the Duke of the Abruzzi in 1897. Glaciers and snowfields in the St. Elias Range and the Canadian Coast Range were also traversed in the repeated series of daring ascents by Brabazon, Mosheim, and other Canadian boundary surveyors in 1894-5 and by Morse, Riggs, Netland, Martin, Eaton, Ogilvie, Baldwin, and other American and Canadian surveyors who have been locating the Alaskan boundary between 1906 and 1913. Dunn, Parker, Cook, Stuck, and others have climbed upon glaciers and snowfields of Mt. Wrangell and in the Alaska Range near Mt. McKinley. The early failures to reach the top of Mt. McKinley and the many attempts necessary before St. Elias was finally ascended are due especially to the glacial conditions. In 1911 and 1912 Miss Dora Keene traversed the Kennicott Glacier in her ascent of Mt. Blackburn.

Glaciers Traversed by Geologists. Early traverses upon glaciers in Alaska were made by Hayes and Schwatka in 1891 northwest of the St. Elias Range, by Schrader in 1898 across Valdez Glacier and by Mendenhall the same year across the Portage Glacier, by Rohn in 1899 across the Wrangell Mountains,—one of the most daring glacier trips during the exploration of Alaska,—and by Brooks, Spurr, Spencer, Gerdine, Witherspoon, Moffit, Capps, and others in various parts of Alaska. These men were not climbing mountains, as was the geologist, Russell, but were necessarily utilizing glacier routes, upon which they happened while engaged in their geological and topographical work. Some of the army officers utilized glacier routes in much the same way.

Prospectors Stampeding Across the Glaciers. The story of the stampede of American prospectors to the port of Valdez and of their travels across Valdez Glacier has been told before, notably by the geologist Schrader, and by the army officers Abercrombie and his lieutenants, who traversed the Valdez Glacier at the same time. No such wholesale travel across a glacier highway has ever

been recorded. It is not remarkable that a barrier[2] such as the Valdez Glacier (Fig. 3) interposes in this pass should have been overcome, for the glacier route is only 24 miles long and the pass but 4,800 feet high. The remarkable fact is that men should have succeeded in packing great outfits of provisions and equipment over this route and have taken horses and mules over the glacier, and that in a single season 3,000 or 4,000 men should have been able to reach the interior of Alaska by this route. Many prospectors, mainly unskilled in glacier travel, stormed this glacier-filled pass and conquered it, passing on with their provisions and other impedimenta. They straggled back in disorder, defeated not by the

FIG. 3—Prospectors on the summit of the Valdez-Klutena through glacier in 1898.

glacier but by the lack of gold and by disease and starvation which overtook them in the open valleys beyond the mountain barrier.

East of Yakutat other glaciers were assailed in the attempt to reach the interior of Alaska. As the lower Alsek River, like the lower Copper, is blocked by glaciers, the most inviting route led by way of Yakutat Bay and Russell Fiord, thence eastward over the through glaciers to an upper part of the Alsek River. The glacier route was harder than that at Valdez, being 40 miles or more in length, but the passes were only 3,000 or 4,000 feet high. There were many more glacial routes here than in the Valdez region, but

2 Martin, L.: Mastering the Alaskan Glacier Barriers, *Scientific American Supplement*, Vol. LXXI, 1911, pp. 305-307; Crossing the Alaskan Glaciers, *Collier's Weekly*, Vol. XLVII, 1911, No. 17, p. 20.

only 300 or 400 prospectors went over them in 1898. The chief routes were across the Nunatak and Fourth Glaciers from Russell Fiord; but Yakutat Glacier was also traversed. Boats, sledges, stoves, etc., were abandoned where these men left the ice (Fig. 4), and some of them have been found by the writer on his visits to the Yakutat Bay region. The route over Fourth Glacier is said to be still utilized occasionally by prospectors.

Glaciers as Barriers to Railroads. Railroad routes are even more subject to geographical control than the simpler highways described above; and, as has been shown by Brooks,[3] the mountains near the coast are serious barriers to railroad building in Alaska.

FIG. 4—End of the Nunatak Glacier highway, showing sleds, snowshoes, boats, a stove and other abandoned impedimenta.

But the great glaciers within these coastal mountains have been even more important as barriers to railroad building, particularly along the lower Alsek and the lower Copper Rivers. In the latter locality, however, where the Miles, Childs, and Allen Glaciers interpose obstacles to river navigation and travel, a railroad has been built in the last few years that is overcoming the difficulties interposed by the ice tongues and providing what may prove to be a permanent highway to the interior of Alaska.

As the map (Fig. 5) shows, there are many difficulties encountered in railroad building past these glaciers. It was neces-

[3] Brooks, A. H.: *U. S. Geol. Surv. Bull. 284*, 1906, pp. 10–17; *Natl. Geogr. Mag.*, Vol. 18, 1907, pp. 165–186; *U. S. Geol. Surv. Bull. 520*, 1912, pp. 45–88.

sary to provide a terminal some distance west of the mouth of Copper River (Fig. 12), whose delta is so shallowed by glacial deposition that ocean-going vessels cannot land there. A deep harbor was sought, accessible to steamships and also protected from ocean winds and waves. This was in southeastern Prince William Sound, where the terminus of the railroad was located, and the town of Cordova has been built.

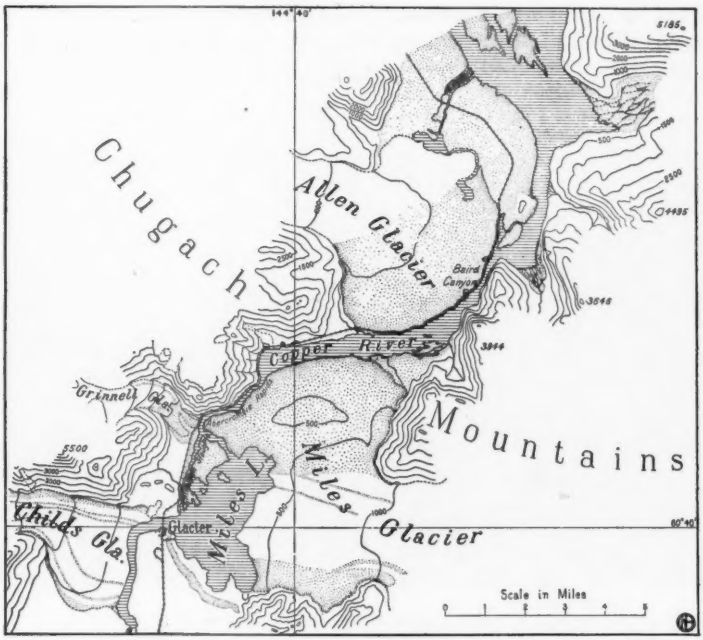

FIG. 5—Map of Miles, Childs and Allen Glaciers in the Copper River canyon, showing the Abercrombie and Baird Canyon Rapids which are caused by constriction of the Copper River by the glaciers.

The railroad runs eastward across the great delta of the Copper River, which coalesces with that built by streams from the Sheridan, Scott, Martin River, and adjacent glaciers. On this part of the route shifting glacial streams made railroad building difficult, and where the rails cross the main Copper River to the east bank two great bridges were necessary. They are respectively 3,350 and 4,000 feet in length and have 1,350 and 600 feet of steel spans.

Their erection and maintenance are hampered by the glacial origin of the river crossed, which is subject to great and rapid fluctuations of volume and load, so that quicksand bottom, erosion, deposition, shifting of channels, and floating ice all added to the problems of the bridge engineers.

The projecting of Miles and Childs Glaciers from tributary valleys nearly opposite each other (Fig. 5) made necessary a second crossing of the river between these two glaciers. Here the river is united in one stream, which is deep and swift, and the steel bridge is 1,550 feet long. The three steel bridges up to this point cost over $4,000,000. Before the bridge was completed a car

FIG. 6—Ferryboat on lake near Miles Glacier in 1909.

ferry (Fig. 6) was used to take locomotives, cars, and supplies to the section of the railroad above this bridge. The glacial conditions favored this, for the constriction of the Copper River by Childs Glacier, which gives rise to the lake in which Miles Glacier terminates, causes relatively slack water in the river above the Childs Glacier rapids. Ferryboat traffic was, therefore, much easier than if a swift current had to be crossed.

Sometimes a glacier advances and threatens a railroad, as Childs Glacier did in 1910,[4] and as Allen Glacier began to do in 1912.

[4] Martin, L.: The National Geographic Society Researches in Alaska, *Natl. Geogr. Mag.*, Vol. 22, 1911, pp. 541-548; Gletscheruntersuchungen längs der Küste von Alaska, *Pet. Mitt.*, Vol. 58, 1912, Aug., pp. 79-81.

Where the expanded bulb of Miles Glacier, now stagnant, long ago pushed the Copper River over into Abercrombie Rapids,—a marginal channel cut in the rock along the mountain side,—the railroad building was made slow and expensive. The glacier occupies the whole valley, and the river sweeps the base of the mountains, so that it was necessary to blast out a shelf on the mountain side on which to lay the tracks. The dangers of rock avalanches and snow slides were forced upon the railroad engineers by the glacial conditions in the valley below. From Cordova to this point, 55 miles, the railroad construction cost over $5,700,000 in addition to the cost of some of the bridges. The whole 200 miles of railroad from Cordova to the Bonanza copper mine cost over $20,000,000, of

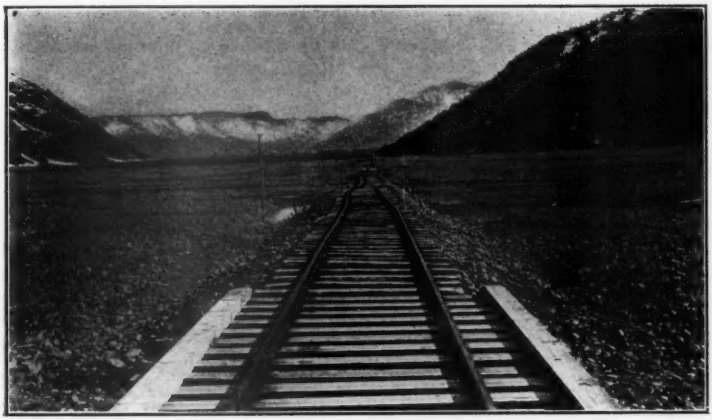

FIG. 7—Alaskan Northern R.R. upon the outwash plain of Spencer Glacier. The bridge in the foreground has been filled 6 or 8 feet with the gravels, which also cause the curves in the formerly straight track.

which the steel bridges across glacial streams and the rock work caused by glacial conditions made up a large part.

Above Abercrombie Rapids the railroad builders faced another dilemma, for here Allen Glacier (Fig. 5) projects from the west clear across the main valley, forcing the river into the Baird Canyon rapids. They decided to build the railroad on the glacier itself and so blasted out a grade across 5½ miles of the stagnant, moraine-veneered, tree-covered ice mass.[4a] Ice lies beneath the ties and rails and future melting will cause slumping and repeated grading. Advance of the glacier will introduce still further difficulties.

4a Martin, L.: Un chemin de fer sur glacier dans l'Alaska, *La Nature*, Vol. 41, 1913, pp. 404–407.

Above Allen Glacier the glacial complications of railroad building seem, now at least, to be of less moment, though glacial streams furnish difficulties and promise permanent expense in upkeep and operation. A slight advance of Kennicott Glacier would destroy the terminus of the railroad and the mine bunkers there.

Other railroads in Alaska have not had similar difficulties. Doubtless glacial erosion of hanging valleys and over-steepening of valley walls added to the expense of building the White Pass and Yukon R.R. above Skagway, though former glacial erosion may have lowered the pass. The Alaska Northern R. R., terminating at Seward, traverses glaciated valleys, but has thus far encountered no trouble from ice tongues. In 1910 this railroad had great difficulty, however, with outwash gravels (Fig. 7) from Spencer Glacier.[5] The construction of the salmon railroad of the Yakutat and Southern R. R. was made easier by the smooth, glacial outwash plain of Yakutat Foreland, over which a large part of its track runs.

Sources of Ice Supply. In Port Valdez, Prince William Sound, the United States army troops at Fort Liscum secure their ice supply for refrigeration (quite as necessary in the mild summer climate of Alaska as in the United States) by sending detachments of soldiers 10 miles down the fiord to Shoup Glacier, where icebergs are gathered upon a lighter and towed by the launch to the fort. If this glacier continues retreating and ceases to be tidal, this supply will be cut off, unless an ice quarry is opened in the glacier.

In southeastern Alaska the glaciers have also been a source of ice supply. Dall[6] relates that a ship took a load of ice for California in the winter of 1853-4 from either LeConte or Baird Glacier. Ice for San Francisco had previously been brought around Cape Horn from Boston, and a company supplied lake ice from freshwater ponds near Sitka and Kodiak between 1852 and 1863. Glacier ice does not seem to have been used except in this one locality. The price varied between $7, $25, $35, and $75 a ton, and one cargo of 250 tons of glacier ice was sold for $18,000. Today the quarrying of ice from non-tidal glaciers might not be profitable, but ice supply gathered from floating icebergs on the Copper River for use at Cordova, in Taku Inlet for use at Juneau, or at some of the numerous canneries is quite within the range of possibilities, though not as profitable as in the days before artificial ice was made.

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[5] Tarr, R. S., and Martin, L.: *Annals Assoc. Amer. Geographers*, Vol. 2, 1912, pp. 25–40.
[6] Dall, W. H.: Alaska and Its Resources, Boston, 1870, p. 252.

In connection with the halibut and salmon fisheries of southeastern Alaska, the fish are packed in iceberg ice from the tidal glaciers[7] near Petersburg and Wrangell, and delivered fresh in Seattle, nearly 800 miles distant. It is said that in some cases they are even shipped to the markets of eastern United States still packed in this glacial ice from Alaska.

Sources of Water Supply for Placer Mining. If large glaciers were still present in the mountains of Seward Peninsula or in parts of the Yukon Valley, where the regions near Rampart, Circle, Iditarod, Ruby, Nome, Eagle, Fairbanks, and Dawson suffer from lack of permanent water supply for placer mining, it would be a great advantage to the miners of these rich camps. Many of

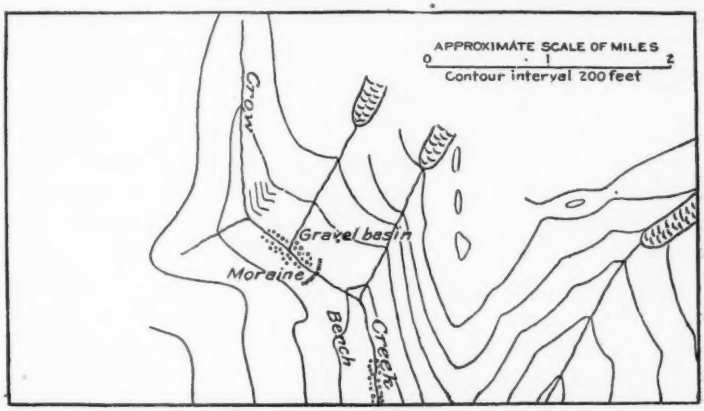

FIG. 8—Morainic dam in valley of Kenai Peninsula, above which auriferous gravels have accumulated in a small basin. (After F. H. Moffit.)

the expensive reservoirs, ditches, and flumes would be unnecessary if glaciers were present to keep the streams full during the summer. Some of the gold fields of other parts of Alaska, where the streams are fed by present day glaciers, as in parts of the Copper River valley, the region south of Mt. McKinley, and parts of southeastern Alaska, have had a great advantage in this respect.

Relation to Placer Gold Deposits. The relation of glaciers to placer gold deposits has been indirect but important. Near Juneau, for example, Spencer has stated[8] that glacial sculpturing of the bed rock resulted in the accumulation of gravels in certain basins

[7] Moser, Jefferson F., *Bull. U. S. Fish Commission*, Vol. XXI. 1902, p. 309.

[8] Spencer, A. C.: The Juneau Gold Belt, *U. S. Geol. Survey Bull. 287*, 1906, pp. 78–79, 84.

and, in these, placer gold deposits are found. He also shows that placer deposits have accumulated upstream from avalanches. The latter are perhaps due to oversteepening of valley walls by glacial erosion.

Near Turnagain Arm, to take an illustration of a different sort, Moffit has shown[9] that the recessional moraine of a glacier has served as a dam (Fig. 8), above which gravels containing placer gold have accumulated. The glacial relationships of placer gold deposits in bench gravels and creek gravels in Alaska have not been sufficiently studied to be well established. In the rich deposits of the Seward Peninsula, the Fairbanks district, and the Alaskan extension of the Klondike, normal stream deposition without glacial stream supply has doubtless resulted in the deposition and concentration of part of the gold-bearing gravels. In many other areas it is glacial outwash that contains the gold. Beach placers, as at Nome and elsewhere, have few if any glacial relationships, but in some parts of Alaska it is possible that the especially high and persistent iceberg waves have resulted in greater concentration of gold in beach gravels, as upon Khantaak Island and Logan Beach when Malaspina and Hubbard Glaciers both ended in outer Yakutat Bay and caused continual iceberg waves in connection with the incessant discharge of icebergs from their fronts.

Obstacles to Mining. In some parts of Alaska the glaciers promise to be obstacles to mining. This is true now only to a slight extent, but may be more of an obstacle as more mines are developed and as the extension of mineral deposits becomes better known. In the Controller Bay coal field, for example, the formation containing the seams of anthracite and bituminous coal extends out beneath the Slope Glacier, under which mining may be impossible at the rather remote period when the large coal-bearing areas are worked out. The same applies to parts of the borders of Martin River Glacier and Bering Glacier (Fig. 12) in the same field. Malaspina Glacier doubtless covers large areas of coal-bearing rocks between the small coal seams on the west side of Yakutat Bay and the thicker seams in the Karr Hills southwest of Mt. St. Elias. Glaciers and glacial streams also complicate transportation and shipping of coal and ores.

The valuable copper deposits in the Wrangell Mountains, to which the railroad from Cordova has been built, are at the east

[9] Moffit, F. H.: Gold Fields of Turnagain Arm Region, *U. S. Geol. Survey Bull.* 277, 1906, pp. 41-42.

border of the great Kennicott Glacier (Fig. 12), beneath which the enriched zone perhaps extends.

Placer gold deposits extend up to the very edges of glaciers, and though there is no known deposit beneath a glacier, a sudden two-mile advance, like that of Hidden Glacier about 1907, would completely bury some gold-bearing gravels now accessible to mining.

Controls of Plant and Animal Life. The minor controls of plant and animal life by glaciers deserve brief mention. Ice-covered areas are, of course, barren. Near the glaciers there is the greatest contrast of vegetation cover, for example between Prince William Sound, where mature forests grow up to the very glacier margins, and the Yakutat Bay region, parts of which have a broad barren zone across which annual plants, willows, alders, cottonwoods, and spruces and other conifers are rapidly following the retreat of the glaciers. Other parts of the same region nearer the sea have trees up to and upon the margins of the glaciers. These vegetation-covers upon the ice are in an unstable position, being easily destroyed by slumping of the ablation moraine soil in which they grow, as the glaciers gradually melt, or destroyed completely during a period of advance, as in the case of the forest on Malaspina, Lucia, Atrevida, and Galiano Glaciers in Yakutat Bay in 1905-6. Forests upon outwash gravel fans in front of glaciers may be mown down by glacial advance or uprooted or buried by the shifting of aggrading glacial streams issuing from the retreating ice fronts, as at Columbia Glacier in Prince William Sound in 1909-11, and in other parts of the territory. Different glacial topographies, soils, and stages of drainage also cause infinite variations of forest, prairie, marsh, and other vegetation covers, as upon the Yakutat Foreland. Animals show similar relationships. There are no bears, wolves, or foxes between the impassably crevassed Hubbard and Nunatak Glaciers in Yakutat Bay, and here ptarmigan are very abundant, and sea gulls nest on the ground instead of seeking inaccessible cliffs. There are almost no deer between Cross Sound and Prince William Sound, where glaciers form a barrier, though deer are abundant to the southeast and caribou to the northwest. Mountain sheep and goats, however, live in most of these mountains. Salmon enter all of the clear streams in great numbers, but avoid most of the swifter and dirtier glacial streams, especially if they head in the glaciers instead of flowing from lakes. Salmon do run, however, in some of the glacial streams which have clear-water tributaries, as in the Copper River. No doubt many

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other relationships of this kind in connection with the plant and animal life will be discovered when special studies are made.

Modification of Climate. To what extent glaciers modify the climate of Alaska cannot yet be determined. The popular misconception that Alaska is bleak and frigid because it has great glaciers should be corrected. A summer, even among the mountains and glaciers, is not unlike a summer in the northern United States near Lake Superior or in parts of New England. Up among the snowfields, however, the glacial influence is naturally potent.

There are local, temporary modifications of climate, for example where down-valley winds from cold glaciers and snowfields cause chilly weather in lower main valleys and perhaps lead to fog and rain. Along the Pacific Coast, however, there are more warm sunny days up among the glaciers, as in Russell Fiord, than on the coast at the base of the mountains. On the whole it is probable that the climate of Alaska, with its existing glaciers, is not greatly unlike what it would be if there were no snow and ice fields, but if the same topography and wind systems were maintained. The influence of the glaciers seems to be distinctly minor, affecting the region in their immediate neighborhood, but extending their influence to no great distance. The Alaskan climate is determined by general causes of topography, latitude, wind direction, and proximity of water, and only locally and in minor degree by glacial conditions. The glaciers are a result of the climatic conditions, not in a notable degree the cause of them.

Cause of Unnavigable Streams. Glaciers give rise to streams that, though of good volume, are likely to be unnavigable because of swiftness and shifting courses, with shallowness and sand bars resulting from the heavy burden of sediment. On the other hand, during the summer months, their melting supplies steady volume to some streams that would not otherwise be navigable.

Where glaciers project into stream valleys the rivers may only be deflected slightly, as in the Stikine River opposite the Great Glacier and in the Copper River opposite Allen Glacier (Fig. 5), where, in each instance, steamer navigation is possible. Greater deflection results in impassable rapids, as where the Alsek Glacier gives rise to the lower rapids of the Alsek River. These rapids are not so swift and steep as is the Copper River, where Childs and Miles Glaciers force it into rapids (Fig. 5), the Abercrombie Rapids especially being entirely impassable for any boats but canoes, and then only at the greatest risk. The lower Copper and Alsek

Rivers, however, are unnavigable except by small boats because of the enormous deposition of glacial sediment upon their deltas.

Navigability has also been interfered with by glacial diversion by ice tongues that have now melted away. Along the historic route from Skagway to the Klondike gold district are the Whitehorse Rapids, in running which so many prospectors lost boats, provisions, and outfits. McConnell has stated[10] that these rapids are due to post-glacial cutting following the diversion of Lewes River by the more extended glaciers. Alaska has many illustrations of this phenomenon, where existing or former glaciers are directly responsible for unnavigability of streams.

As a result of the formation of hanging valleys, out of which streams descend in cascades and waterfalls and the production of waterfalls and rapids by glacial diversions and other forms of glacial interference with drainage, there has arisen a series of unutilized waterpowers of incalculable future value for generating electricity for motive power, lighting, hydraulic mining, running machinery at mines, canneries, etc., and long distance transmission for all sorts of uses in connection with the development of the great resources of Alaska.

Making Lakes. Lakes due to glacial erosion and deposition are abundant throughout Alaska. There are many long, narrow bodies of water, or finger lakes, most of them apparently due especially to glacial erosion, for example, Lakes Kenai, Klutena, Kluane, Sekulmun, Aishihik, Kusana, Lebarge, Marsh, Bennett, Tagish, Taku Arm, and many others. There are broader, irregular lakes, apparently dammed by glacial moraine accumulations, such as Lakes Iliamna, Clark, Tustumena, Skilak, and perhaps Kukaklek, Naknek, Becharof and the Ugashik Lakes. Bering Lake (Fig. 12) seems to be the head of Controller Bay cut off by the enormous glacial deposition by the streams from the west side of Bering Glacier. There are innumerable small glacial lakes along the margins of existing glaciers. There are great numbers of other small lakes due to erosion of minor rock basins by glaciers or to irregularities in the glacial drift.

Making Fiords. The fiords of the Inside Passage in southeastern Alaska, such as Lynn Canal, Chatham Strait, Stephens Passage, Behm and Portland Canals, and many others, and fiords like Glacier, Lituya, and Yakutat Bays and the branches of Prince William Sound are so obviously the result of former extension of the Alas-

[10] McConnell, R. G.: Report on the Whitehorse Copper Belt, p. 4. Geol. Survey of Canada, 1908.

kan glaciers that the explanation of their origin does not need amplification here. The straightness, as in the 90 miles of Lynn Canal, the depth, often over 1,000 feet, the general U-shape, the oversteepened lower slopes, the hanging of many tributary valleys above the main fiords, the resulting abundance of beautiful waterfalls, all these are now generally conceded to be the result of glacial erosion.[11] Gannett has computed[12] that more than 200 cubic miles of rock were eroded from Lynn Canal alone. This is a submerged coast but not necessarily a drowned coast, Gilbert having shown[13] that glaciers may have eroded the existing fiords without a change

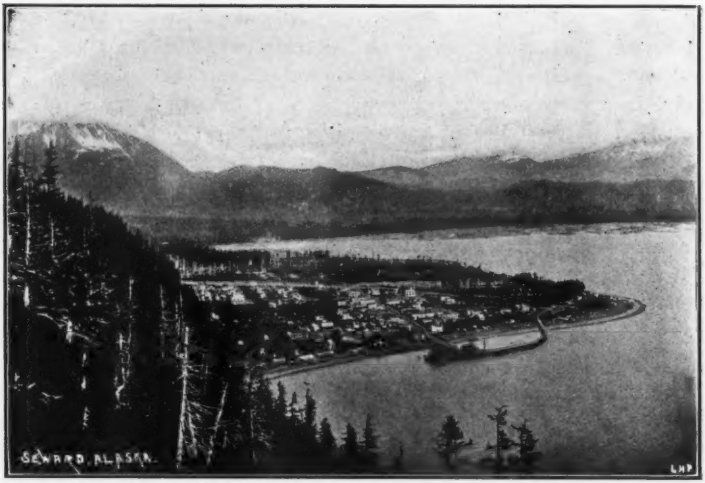

FIG. 9—The city of Seward on the delta of a glacial stream in the ice-sculptured fiord called Resurrection Bay.

of sea level. Post-glacial sinking seems possible, but is not proved absolutely. Some of the finest scenery in the world has been produced, and it particularly emphasizes the relationship of glaciation to life, in connection with the navigability of these protected inner arms of the sea and the possibility of viewing this fiord scenery from the deck of a steamer.

There are certain detrimental features of this glacial erosion also. Islands have been so eroded that they no longer rise above sea level

[11] Tarr, R. S.: Glacial Erosion in Alaska, *Pop. Sci. Monthly*, Vol. 70, 1907, pp. 99-110.
[12] Gannett, Henry. *Nat. Geog. Mag.*, Vol. 12, 1901, p. 181.
[13] Gilbert, G. K. Harriman Alaska Expedition, Vol. III, 1904, pp. 210-218.

and, therefore, form dangerous reefs, a distinct menace to navigation in the partly uncharted and unlighted condition of this coast. The alternations of the maze of wide and narrow channels, with irregular tides sweeping in from various directions through the straits and fiords, causes very high and very swift tides in some places, adding to the hazard of navigation. Floating icebergs from the existing tidal glaciers also constitute a danger to ships traversing these waters. The toll paid to these dangers is already great, and one sees the evidence of it here and there along the Inside Passage where the wrecks of former days are still visible.

Town Sites. With the superabundance of harbors the sites of coast towns may or may not be related to glacial conditions. Sitka,

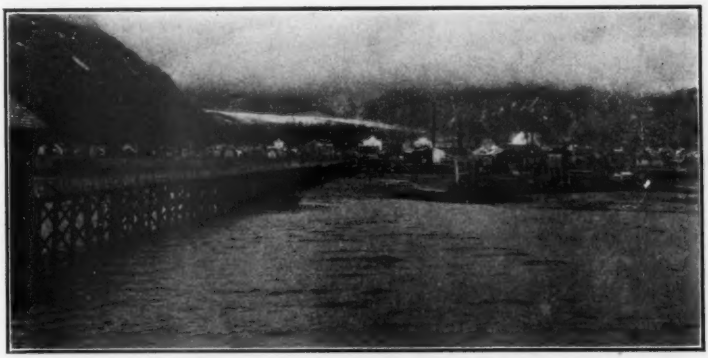

FIG. 10—One of the long piers at Valdez, made necessary by the deposits of glacial streams.

Ketchikan, and Kodiak are on glaciated lowlands; Juneau and Skagway are each on the side of a glacially-shaped fiord; Cordova and Seward (Fig. 9) are located on good harbors where glaciation has modified the topography, glacial erosion perhaps increasing the depth of water so that steamships can come in close to shore. In all these towns the glacial influence is minor and cannot be said to have been the only determining influence in their location. A slight advance of Bear Glacier on Resurrection Bay near Seward, or of Shoup Glacier near Valdez would damage these harbors immeasurably, if indeed it did not stop steamer traffic completely.

Shallow water from deposition by glacier-fed streams makes necessary the long piers at Skagway and Valdez (Fig. 10). Katalla (Fig. 12) has a town site located where it is because a landing place was needed close to the great Controller Bay coal fields, but to be

of value it must be protected by an expensive breakwater. Glacial streams from the Bering Glacier have so shallowed Controller Bay that a good harbor here is lacking, though if permanent deep channels exist a fair town site may be situated later near Okalee Spit in the eastern part of Controller Bay.

Valdez is on a glacial outwash gravel plain. The town was founded because of the former travel across the glacier and, since this ceased, has been maintained because of the trail and road across the mountains behind and, before the building of the Copper River and North-

FIG. 11—Cabins in the city of Valdez overthrown by the shifting of a glacial stream in 1905.

western Railroad, because of the glacial barrier in the lower Copper River. Only recently gold has been found at Valdez. Glacial streams sometimes threaten the town, as when streets were flooded and houses swept away in 1905 (Fig. 11). Valdez, on a deep, glacially eroded fiord, and one of the most beautifully situated towns in Alaska from the point of view of scenery, has one of the poorest sites as far as permanency is concerned. This town site perhaps shows more direct relationships to existing glaciers than any other.

FIG. 12—Map showing (a) the relationship of the Bering River coal field near Controlle
relationship of the Copper River delta to the location of the town of Cordova,
and (d) the relationship of the Copper River and Northwestern Railroad to t
ice-tongues near the Bonanza copper mine at Kennicott. (After U. S.

...ear Controller Bay to the Bering and Martin River Glaciers, (b) the ... of Cordova, (c) of the City of Valdez to the Valdez Glacier, ... Railroad to the Miles, Childs, and Allen Glaciers and the ... (After U. S. Geological Survey.) Scale 1:1,250,000.

THE NEW BOUNDARIES OF THE BALKAN STATES AND THEIR SIGNIFICANCE

By W. L. G. JOERG

(Map facing p. 830.)

Sufficient details are now available to justify the publication of a map showing the new boundaries of the Balkan States. The map presented herewith is based mainly on two maps compiled by Dr. Karl Peucker and published by the firm of Artaria & Co. in Vienna.[1] Valuable material was also gleaned from the Weekly Edition of the London *Times*. The map must still be considered provisional, however, mainly as regards the Serbo-Montenegrin frontier and the southern boundary of Albania, both of which are still to be definitely settled, and the Turco-Bulgarian frontier in Thrace, the details of which are not yet available at the time of writing.

Boundary-Defining Decrees. The main decrees which define the new boundaries are those contained in the Treaty of London, signed May 30, 1913, in the decisions of the London Ambassadorial Conference, in the Treaty of Bukharest, signed August 10, 1913, and in the Treaty of Constantinople, signed September 17, 1913. The first, between the Balkan Allies on the one hand and Turkey on the other, stipulated the relinquishment of all Ottoman territory in Europe up to a line connecting the northern shore of the Gulf of Xeros with Midia on the Black Sea (cf. the map). The second created the new state of Albania and defined its boundaries. The third apportioned the ceded Turkish territory, except Albania, between the former Balkan Allies, and changed the eastern part of the Rumanian-Bulgarian boundary. The fourth agreement, between Turkey and Bulgaria, substituted for the Gulf of Xeros-Midia line of the Treaty of London a more landward boundary which leaves Adrianople to Turkey.

New Boundaries: (a) Albania. Referring first to Albania, a glance at the map shows that this new state occupies the Adriatic

[1] (a) Südost-Europa: Die Balkanhalbinsel, Rumänien u. Österreich-Ungarn bis Wien und Budapest. Bearbeitet von Dr. Karl Peucker. 1:2,000,000. 5. Auflage, mit den neuen Grenzen. Artaria & Co., Wien, [Aug.] 1913. Price, K. 1.80.

(b) Die zentralen Balkanländer zwischen Adria u. Pontus. Auf Grundlage der II. Ausgabe von Schedas' Balkankarte. Bearbeitet von Dr. Karl Peucker. 1:864,000. 4. Auflage, mit den neuen Grenzen. Artaria & Co., Wien, [Aug.] 1913. Price, K. 3.

side of the peninsula as a strip roughly 60 miles broad between latitudes 42½° and 39⅔° N. Specifically, its land boundary, as defined by the Ambassadorial Conference, in the north begins at the mouth of the Boyana River, crosses Skutari Lake so as to include the town of Skutari in Albania and then follows the crest of the North Albanian Alps and a southeastern offshoot so as to exclude the towns of Djakova and Prizren. Continuing, the boundary in general runs south parallel to the coast of the Adriatic, following for a short distance the White Drin, then the crest of a meridional spur of the Shar Dagh and the southern continuation of this spur, the Yablanitza Range, so that the town of Dibra is excluded, then bisecting Lake Okhrida and sweeping around the southern end of Lake Prespa to continue for a short distance on the divide between Adriatic and Aegean drainage—leaving Koritza to Albania—as far as the Grammos Range. From this point to near the coast the southern boundary is not as yet defined. According to a statement by Sir Edward Grey in the House of Commons on August 12[2] its delimitation will be carried out by an international commission with a view to its coinciding with the racial boundary as far as possible. The emergence of the southern boundary on the Adriatic is definitely fixed; it strikes the coast at Cape Stylos opposite Corfu. (The geographical objects here and subsequently enumerated, which are not shown on the accompanying map, may be identified in any general atlas.)

Turning now to the other Balkan States we see that they have all increased their domain, some to a considerable extent.

(b) Montenegro. Montenegro in the south has gained two small areas, one on the neck of land between the Adriatic and Skutari Lake—although it failed to acquire the coveted town of Skutari—the other, north of the lake, constituting the territory of the Hoti clan. The kingdom's greatest territorial increase is on its northeastern side. Although the boundary has not yet been finally decided upon, in general terms it may be said that Montenegro will receive the southwestern longitudinal half of the former Turkish *sanjak* of Novibazar. Possibly the boundary may run from the Bosnian frontier up the Lim River to 43°5′ N. and thence southeast to the northeast corner of Albania, leaving Djakova to Montenegro, as shown on the accompanying map.

(c) Servia. Servia, to offset her failure to acquire the long-

[2] London *Times*, Weekly Edition, Aug. 15, 1913, p. 655.

sought outlet to the Adriatic, has been alotted territory to the south almost equaling her former area in extent; this increment has not, however, altered her status as the only inland state in the Balkan Peninsula nor as one of the two only interior countries of Europe. Her former eastern boundary has been continued southward, at first coinciding with the former boundary between Bulgaria and the Turkish *vilayet* of Kóssovo and then describing a wide semicircle to Lake Doiran so as to leave the greater part of the Strumitzą valley to Bulgaria. From Lake Doiran, on the range north of which the confines of Bulgaria, Servia and Greece meet, the southern boundary of Servia runs in a westerly direction, crossing the Vardar valley at right angles and continuing on the crest of the Nidje Range to about 21⅘° E. longitude and then due west to Lake Prespa, which will probably be included within Servia, although this part of the boundary has not yet been definitely settled.

(d) Greece. Through the Balkan conflict Greece has come into her own as the Aegean power *par excellence.* Besides the western half of the north coast of the Aegean she has acquired the majority of the islands fringing the western coast of Asia Minor, as well as Crete. The Aegean has therefore become politically what, due to the maritime supremacy of the Greeks, it has long been in fact, a Greek sea. To complete the definition of her present boundaries it remains only to follow the Greek-Bulgarian frontier, inasmuch as the Greco-Albanian and Greco-Servian boundaries have already been described, and to enumerate the ceded islands. Starting from the junction of the Servian, Bulgarian and Greek boundaries just north of Lake Doiran, the Greco-Bulgarian frontier runs in general in an easterly direction, first following the crest of the Belashiza Range; then, after crossing the Struma valley, it continues along several minor ridges and across the southern spurs of the Rhodope Mountains in an east-northeasterly direction to about 21¼° E. longitude, whence it sweeps around to the southeast along the eastern edge of the drainage basin of the Mesta (Karasu) River until it meets the river where it enters the coastal plain. It then follows the river for the remaining eighteen odd miles to its outlet in the Aegean. Here begins the eastern, the water boundary which encloses the Aegean Islands. In the north Thasos, Samothrace, Lemnos and Hagiostrati become Greek, leaving Imbros and Tenedos to Turkey in view of their proximity to the Dardanelles. Farther south Lesbos, Psara, Chios, Samos, Nikaria and the Phurni group fall to Greece. The Sporades, with the exception of a few small islands

south of Samos, from Patmos to Karpathos and Stampalu to Rhodes, are still under the military occupation of Italy as a consequence of the Turco-Italian war. Their fate will be settled by the Powers. In view of the stipulation to that effect in the Treaty of Lausanne, which terminated the Turco-Italian War, it seems probable that they will be returned to Turkey.[3]

(e) Rumania. Rumania is the only state whose increase has not been at the expense of Turkish territory. As a condition for the termination of her short war with Bulgaria she exacted and received a piece of land, roughly triangular in shape, at the eastern end of the Rumanian-Bulgarian frontier, whose apex lies on the Danube and whose base is formed by the coast of the Black Sea. The new boundary starts on the Danube, in 26½° E. longitude, to the west of the town of Tutrakan (Turtukai) and continues in a general southeasterly direction paralleling to the north the Rustchuk-Varna railroad, which remains Bulgarian, until it strikes the Black Sea about 12 or 15 miles north of Varna. Rumania thus acquires both banks of the Danube for an additional distance of about 40 miles as well as the important fortified town of Silistra.

(f) Bulgaria. Bulgaria's new southwestern boundary is apparent from the previous description of Servia and Greece's frontiers. The remaining southeastern boundary, which has just been defined by the Turco-Bulgarian Treaty of Constantinople, runs roughly as follows: Beginning on the Aegean at the mouth of the Maritza it ascends this river approximately to Sufli, whence it continues in a northward direction to the old Bulgarian-Turkish frontier in such a manner as to leave the towns Ortakeui and Mustafa Pasha to Bulgaria and Demotica to Turkey. From here for a certain distance to the east the new boundary between Bulgaria and Turkey may coincide with the old—sufficient details for more accurate definition are still wanting—to about 27° E. longitude, whence the boundary runs east to the Black Sea at Sveti Stefan,[3a] a town which lies just south of the 42nd parallel, leaving part of the northeastern slopes of the Istrandja Dag, with the chief town Malko-Tirnovo, to Bulgaria and the Thracian plain, with Kirk-Kilisse and Adrianople, to Turkey.

Areas of Present States: How Determined. So radical changes in the political configuration naturally suggest the question, What are the areas of the present states and how do these compare with

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3 London *Times*, Weekly Edition, Aug. 15, 1913, p. 655.

3a *ibid.*, Sept. 19, 1913, p. 749 (see note 4a).

the former extent of their territory? As no statistics were available, in order to answer this question a computation of the new areas was undertaken. The best method to determine areas is, of course, the planimetric; but as no planimeter was available the area was computed by what has been termed the "method of squares."[4] This merely consists of dividing up each "square" degree into an appropriate number of homologous subdivisions and then estimating, say, to the nearest tenth the area in each subdivision of the territory to be measured. In the present case this method is entirely adequate in view of the tentative nature of several parts of the boundaries and the lack of definiteness even in those that have been agreed upon by treaty. The resulting figures, furthermore, in that they are best expressed in round numbers, are more easily retained than figures expressed to the nearest unit, which, in this case, would convey an impression of accuracy not warranted by the circumstances.

Explanation of Table. In the table given below the areas of the Balkan States prior to the Balkan War (first column) were taken from the 1913 issue of the Almanach de Gotha after having been changed from square kilometers to square miles, the resulting figures practically coinciding with those given in the Statesman's Year Book for 1913 in every case except Montenegro and Bulgaria. The values in the second column represent the increase of territory of the different states subsequent to the Balkan War, as determined by the "method of squares" applied to the map on the scale of 1:864,000 referred to under (b) in footnote 1 and within the boundaries described above.[4a] The values are given as determined to the nearest unit; this should not, however, lead to an overestimation of their accuracy. To neutralize this and obtain more equitable numbers the figures in the third column have been rounded off from the sums obtained by adding the figures in the first and second columns, with which sums, therefore, they do not strictly agree. However, in their approximation they are, in principle, correct and are, therefore, within the limitations due to the indefiniteness of some of the boundaries, suited to convey general impressions of size. The percentages of increase in the fourth column represent the ratio of the figures in the second column to those in the first.

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[4] cf. Krümmel and Eckert: Geographisches Praktikum, Leipzig, 1908, p. 40.

[4a] On the map, the Turco-Bulgarian boundary is shown to strike the Black Sea at Midia. The information as to its striking the coast at Sveti Stefan came too late to be incorporated. The areas given for Bulgaria and Turkey in the table, however, are based on this more recent definition.

AREA OF BALKAN STATES
(in square miles)

STATE	FORMER AREA	APPROXIMATE INCREMENT	PRESENT AREA IN ROUND NUMBERS	PERCENTAGE OF INCREASE
Montenegro	3,506	2,074	5,600	60%
Albania	.....	.....	10,900	...
Servia	18,650	14,910	33,600	80%
Rumania	50,720	3,622	54,300	7%
Bulgaria	37,201	6,102[5]	43,300	16%
Greece	24,966	21,660[6]	46,600	87%
Turkey in Europe	65,370	−55,650[7]	9,700	−85%[7]

Test of Accuracy of Table. The general accuracy of the table may be tested by comparing the former combined area of the Balkan States with their present total area, which, of course, should coincide. Inasmuch as the values in the third column, which represent the present areas, are rounded off to the nearest hundred, it is advisable first to compute the individual areas from the figures given to the nearest unit in the first and second columns and then to add these together. If the value which was obtained for the area of Albania, 10,865 square miles, be used this total will amount to 203,996 square miles. To insure a proper comparison, however, from this sum must be deducted the insular increment of Greece, with the exception of the area of Thasos (5,078 sq. miles—142 sq. miles=4,936 sq. miles), in view of the fact that of the Aegean Islands acquired by Greece none except Thasos belonged to Turkey in Europe. With this proviso we get as the total area of the Balkan States 199,060 square miles. The total of the first column is 200,413 square miles, which is a very satisfactory approximation, when all the elements of inaccuracy involved are considered.

Growth of States. From the fourth column in the table the territorial increase of the different states can be seen at a glance. Greece has profited most by the upheaval, falling only a little short of doubling her former area. When it is remembered that this increase refers merely to her land area and that, through her acquisition of Crete and of the islands along the coast of Asia Minor, she has extended her domain over an area some 300 miles wide from east to west and 450 miles long from north to south, her future

[5] 9,724 sq. miles acquired from Turkey minus 3,622 sq. miles ceded to Rumania.

[6] 16,582 sq. miles continental plus 5,078 sq. miles insular increment (including Crete). The area of the Aegean Islands, except Crete, was taken from Bevölkerung der Erde: VIII, pp. 43 and 121; of Crete, from the same: XIII, p. 117, *Ergänzungsheft zu Petermanns Mitteilungen Nos. 101 and 163*, 1891 and 1909, respectively.

[7] Decrease.

importance in Balkan matters will become apparent. Next in order of increase are Servia, which has grown by four-fifths of her former area, and Montenegro, which has augmented even her small territory by three-fifths. In comparison the growth of Bulgaria by one-sixth seems small; it is hardly commensurate with her initial successes during the war against Turkey. Rumania's acquisition, although equaling the former area of Montenegro, is relatively small. The greatest contrast is offered by Turkey, which has diminished in the same ratio that Greece has increased. As regards relative size the new order of things has made on the whole for that equality which has been aimed at by those who desire to maintain the balance of power in the peninsula. The four important states, Greece, Bulgaria, Servia and Rumania, are all of comparable size, while Montenegro retains her position as the smallest country. Turkey, in spite of her *débacle*, has still been able to retain an area in Europe nearly as large as that of the new state of Albania.

Comparative Sizes. In order to realize the significance of these territorial changes in the Balkan Peninsula, it may be helpful to visualize the areas involved by means of comparison with more familiar units. Thus, Albania is somewhat smaller than Maryland and somewhat larger than Vermont or New Hampshire. Compared to a European country it is as large as Belgium. Montenegro is somewhat smaller than Connecticut and Rhode Island together. Servia, increased by an area nearly as large as of Switzerland, is about the size of Maine. The triangle of territory acquired by Rumania is about as large as Delaware and Rhode Island together and has given her the same extent as Illinois, Iowa or Wisconsin. Bulgaria, if the Gulf of Xeros-Midia line of the Treaty of London had been adhered to, would have received an area equaling twice that of New Jersey. Now, due to her loss to Rumania, her net increment is not as large as Connecticut and Rhode Island together and her total area smaller than Pennsylvania. Greece, from an area the same as that of West Virginia, has grown to equal Mississippi. Turkey from a size equal to somewhat less than that of the state of Washington has dwindled to the size of Vermont.

New Railroads. The economic value of the newly acquired territories would also be a legitimate topic of inquiry. Space forbids, however, going into this matter in detail. Nevertheless, one of its most important phases, the construction of new railroad lines, may be briefly alluded to here.

With the withdrawal of Turkish dominion Salonica promises to

derive the full benefit of her position at the extremity of one of the two major trade routes of the Balkan Peninsula—the Morava-Vardar depression—and develop into an important port of transshipment for the trade of Central Europe bound for the East *via* the Suez Canal. The possible construction of a railroad connecting the Albanian ports Durazzo and Valona with Monastir (cf. the map), which is already in communication by rail with Salonica, would focus additional commerce upon this port by furnishing a connecting link with the Adriatic. In addition, the completion, soon to be expected, of the gap between the Bosnian frontier and Mitrovitza, besides hastening the development of the former *sanjak* of Novibazar, will bring the Bosnian railroad and the territory for which it is the outlet into direct connection with Salonica. And, finally, the Greeks, now that the intervening territory is theirs, will doubtless hasten to join their railroad system, which has been forced to halt at the former Turco-Greek frontier (40° N.; see map) since 1909, to that of the central and northern part of the peninsula. The natural route for this connecting link would be along the western shore of the Gulf of Salonica to Salonica.

Crossing these routes which seek the Ægean as their outlet are those whose objective is the Adriatic. It was for the control of these routes that Servia contended. Inasmuch as the creation of Albania has blocked her coveted access to the Adriatic, it is probable that she will turn to the Ægean for her outlet. Nevertheless the route, at one time proposed, from Skoplye *via* Dibra to Durazzo, if supplemented by the construction of the short gap between the Bulgarian frontier and Kumanovo, might still come into consideration in view of its affording connection, locally, between Bulgaria and Albania and, generally, between the Black Sea littoral and Italy. The short line along the coast of the Adriatic from Durazzo to Skutari, being entirely within Albanian territory, seems likely to be built.

In the east the most important railroad affected by the new conditions is the branch which leaves the Belgrade-Sofia-Constantinople trunk line south of Adrianople and reaches the Ægean at Dedeagatch. Disappointed in her hopes of acquiring Salonica or at least Kavala as an Ægean port, Bulgaria counted on developing Dedeagatch as her outlet to the south. The necessary territory seemed guaranteed by the Treaty of London. Now, however, that the recent Treaty of Constantinople has allotted the valley of the Maritza, from below Mustafa Pasha to above Sufli, with the section of the railroad that follows it, to Turkey, Bulgaria may be forced,

in spite of the unfavorable terrain, to construct her own railroad between these two towns, in order to insure the passage of this highway entirely through her own territory.

Of the projected lines in this region the railroad to connect Seres with Sofia *via* the Struma valley and the short spur to be built from the line paralleling the north shore of the Ægean to Kavala, which will give this port access by rail to the interior, are all that need be mentioned.

Population and Racial Distribution. But, as a recent writer has remarked, the Balkan question is not one of areas in square miles or of goods and chattels, but of human beings with human hearts and aspirations. No solution of the Balkan problem will prove satisfactory that does not recognize the principle of nationalities. It is therefore eminently worth while in conclusion to determine to what extent the present political boundaries satisfy this demand.

(a) Population. As a preliminary inquiry it may be of interest to attempt to determine the population of the new states. It is almost impossible to do this with any approach to correctness in view of the fact that the portions of former Turkish territory allotted to the various Balkan states do not in general coincide with the administrative units, the *vilayets* and *sanjaks,* into which Turkey in Europe was divided. Even so, the population statistics for these units were far from reliable. Furthermore, it must be remembered that the loss in human life due to the Balkan wars has been enough to affect even so general statistics as those of population, while the always unstable racial equilibrium of the peninsula has received so severe a blow that radical changes in the distribution of the constituent nationalities, particularly the withdrawal of a considerable number of the Turks, may be expected as a result of the recent upheaval. Nevertheless, an attempt has been made in the following table to estimate the population as at present constituted. If the above-mentioned restrictions are borne in mind the figures given may at least be of some use in conveying general conceptions. The populations of Bulgaria and Rumania prior to the Balkan War are based on recent censuses, those of Greece and Servia on estimates based on recent censuses, while those of Montenegro and Turkey in Europe are only derived from estimates, which are of a critical character, however. The sources for the values used are given in the footnotes. The present populations have been estimated with the aid of the populations of the *sanjaks* of European Turkey and of the Aegean Islands as given in "Die Be-

völkerung der Erde" (respectively, No. XIII, pp. 118-119, and No. VIII, pp. 43 and 270). The portions of the various *sanjaks* allotted to the different Balkan states were deduced from Dr. Peucker's maps of the new boundaries, and the attempt was made to estimate the proportion of the population falling within the jurisdiction of the new states. The result can, of course, only be the merest approximation. The figures arrived at, however, coincide very well with those published in the Weekly Edition of the London *Times* for August 8, 1913 (p. 629), except for the population of Albania, which is there evidently far too large (2,000,000), a more plausible figure (840,000) being given in the August 15 issue of the same journal on page 655. However, the close concurrence in this table also of the comparable values, viz. 24,255,000 (total of the first column, plus 620,000, the population of the islands annexed by Greece) and 24,100,000 (total of the second column, which includes these islands), seems to indicate a certain degree of trustworthiness for the figures presented.

POPULATION OF THE BALKAN STATES.

STATES	PRIOR TO BALKAN WAR (IN ROUND NUMBERS)	PRESENT
Montenegro	285,000[8]	500,000
Albania	.....	900,000
Servia	2,960,000[9]	4,300,000
Rumania	7,250,000[10]	7,400,000
Bulgaria	4,340,000[11]	4,800,000
Greece	2,670,000[12]	4,600,000
Turkey in Europe	6,130,000[8]	1,600,000
	23,635,000	24,100,000

(b) Racial Distribution. How are the nationalities which make up these 24,000,000 of Balkan peoples apportioned among the new political units? The best answer to this question will probably be found by comparing the new political map with Professor Cvijić's recent authoritative ethnographic map of the Balkan Peninsula[13]

[8] Almanach de Gotha, 1913.

[9] Estimate for Dec. 31, 1911 (Almanach de Gotha, 1913).

[10] Census of Dec. 19, 1912 (Statesman's Yearbook, 1913).

[11] Census of Dec. 31, 1910 (Statesman's Yearbook, 1913).

[12] Estimated population, 1909 (Statesman's Yearbook, 1913).

[13] Ethnographische Karte der Balkanhalbinsel nach allen vorhandenen Quellen und eigenen Beobachtungen von Prof. Dr. J. Cvijić. 1:1,500,000. Accompanies, as Taf. 22, "Die ethnographische Abgrenzung der Völker auf der Balkanhalbinsel" by J. Cvijić, *Petermanns Mitteilungen*, Vol. 59, 1913, I, pp. 113-118, 185-189, 244-246.

which was commented on at length in the *Bulletin* for June (Vol. 45, 1913, pp. 479-480). A perusal of these two maps shows that at last the guiding principle of European history since the beginning of the nineteenth century, the establishment of coincident racial and political boundaries, has made itself felt in Balkan affairs. On broad lines the present political divisions correspond to, or at least do not overlap over, the large ethnographic groups. The extraneous nature of the Albanians has been recognized; they have been segregated from the other peoples and established as a separate unit. The Greeks have received politically the regions that have long been theirs ethnically: northern Thessaly, southern Epirus, part of the northern coast of the Aegean, and the greater part of the Aegean Islands not already theirs, including Crete. Bulgaria has spread southward to the Aegean, although in a region which was ethnically less hers than were the upper Struma and Mesta valleys in her southwestern corner, which have, in part, been allotted to Greece. Servia has seen her long-cherished dream come true in the re-acquisition of Old Servia—the former Turkish *vilayet* of Kóssovo. Although she does not, even now, encompass the whole territory inhabited by the Servian race, she has the satisfaction of knowing that the only portion of Turkish territory with a Servian population remaining to be allotted—the *sanjak* of Novibazar—was divided between her and her sister state, Montenegro.

Along with these satisfactory allotments of territory there are the inevitable minor discrepancies. For who can divide equitably where the racial pattern is so complicated a mosaic? North of Seres Greece has received some territory inhabited by Bulgarians, while the Bulgarian outlet to the Aegean contains enclaves of Greek population, although this territory was mainly inhabited by Turks. Rumania, too, has added to her slight Bulgarian population through her acquisition of Bulgarian territory. But these discrepancies are negligible as compared with the allotment of the Macedonian population. An equitable apportionment is here rendered difficult by the very character of the Macedonians themselves. They are possibly best characterized as Slavs representing a transition between Servians and Bulgarians. In view of their exceptional nature Professor Cvijić has represented them separately on his ethnographic map. According to him they occupy, except for Turkish and other enclaves, the quadrilateral included between the following points: Lake Okhrida, the junction of the old and the new parts of the western boundary of Bulgaria, a point about 20

miles south of Lake Prespa, and Salonica. The accompanying map shows that the southern slice of this quadrilateral has been allotted to Greece, a non-related race, while practically all of the remainder has been acquired by Servia.

However, these minor discrepancies should not obscure the fact that the reapportionment of Balkan territory on broad lines *does* satisfy the requirements of the principle of nationalities. In this lies the significance of the recent conflicts; in this, too, lies the hope of the future. Given the opportunity to work out their own destinies, the Balkan peoples, we may hope, will enter upon a new era of progress and development.

XUM

N. B.—The eastern end of the Turco-Bulgarian boundary should strike the Black

rike the Black Sea at the 42nd parallel, and not as shown.

GEOGRAPHICAL INFLUENCES IN THE DEVELOPMENT OF WISCONSIN *

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CHAPTER VI. DEVELOPMENT OF AGRICULTURE

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Agriculture began in Wisconsin in prehistoric times. When Nicolet came to Wisconsin in 1634 he found large, cultivated fields containing corn, melons, pumpkins, beans, tobacco, and other native plants in the vicinity of the Winnebago village on the shore of Green Bay. Carver (1766) found similar products at the thriving Indian village on an island at the east side of Lake Winnebago. The Sauks and Foxes cultivated large fields along the Wisconsin River, notably at Sauk Prairie. It is said that, until recently, Indian corn hills were still visible here on ground that had never been broken by the whites. The savages cultivated the young corn by hoeing toward the hill, and as they planted each time in the same spot the hill grew in size with each crop until it was often a foot or more in height.[1] When corn was no longer planted there the ground became covered with sod, which preserved the hills.

* Continued from pp. 401-412, 490-499, 585-609, 653-663, and 736-749.

[1] Hibbard, B. H.: Indian Agriculture in Southern Wisconsin, *Wis. Hist. Soc. Proc.*, 1904, p. 146.

The corn was picked by the Indians before it was fully ripe and packed in dry grass in a cellar in the ground which, when filled, was covered with straw and dry earth.[2] Travelers, traders, explorers, and early military expeditions were furnished with supplies from the stores of the savages. Even the troops which finally drove the Indians from their homes "filled their camp kettles either from the caches or the cornfields of the fugitives."[3] The first spots cultivated by white settlers were the fields of the Indians, and the first planting was with Indian seed. The corn and tobacco so highly prized by the savages are now two of Wisconsin's important crops.

The French did little farming. Each trading post, however, had its patch of cultivated ground which furnished the inhabitants with potatoes and corn. More extensive farming was carried on at Green Bay and Prairie du Chien than at the other posts. In 1816 a traveler reports that the farmers of Prairie du Chien were more thrifty and industrious than those of Green Bay. They raised wheat, barley, oats, peas, potatoes, and onions.[4] Small flouring mills, the stones for which had been cut from the granite rocks near by, were run by horse power, and were owned in partnership by two or three farmers. The surplus product was sold to the traders for goods or to the Indians for game and dressed deer skins.

In early days, the soil was cultivated in the most primitive fashion. The plow was a pointed stick drawn by oxen. The ground was scratched with this implement, and the planting of the seeds and further cultivation was done with a hoe. For a time, prices for farm produce were high. In 1816 flour was $10 a hundredweight, corn $3 a bushel, and eggs $1 a dozen.[5] These high prices were balanced by the equally expensive goods of the traders. Tea was $8 a pound, soap $1, tobacco $2, calico $2 a yard, clay pipes 40¢ each.[6]

The first considerable demand for provisions came from the lead miners, who paid dearly for their living. As we have seen, they induced farmers to come into the lead region in order to supply them with cheap provisions. It was not, however, until after the influx of immigration in 1832 that agriculture became really important.

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[2] Hibbard, B. H.: Indian Agriculture in Southern Wisconsin, *Wis. Hist. Soc. Proc.*, 1904, p. 150.

[3] *Ibid.*, p. 155.

[4] Lockwood, J. H.: Early Times and Events in Wisconsin, *Wis. Hist. Coll.*, Vol. II, p. 112.

[5] Forsyth, T.: Voyage from St. Louis to the Falls of St. Anthony in 1819, *Wis. Hist. Coll.*, Vol. VI, p. 199.

[6] Lockwood, *op. cit.*, p. 113

The new immigrants came to a soil for the most part untouched and generally fertile, as indicated in Chapter I. The whole southeastern part of the state is covered by glacial clay on limestone and sandstone (Fig. 5, in Chap. I, p. 410). The soil of the southwestern part is a residual clay covered, particularly along the Mississippi River, by loess, which increases its fertility. Along Lake Michigan, and extending from Green Bay to south of Lake Winnebago, are two areas of red clays, chiefly lacustrine in origin. This region is low and the character of the soil is such as to render artificial drainage necessary. When drained properly the soil is very fertile. Sandy loams extend from Columbia, Green Lake, and Waupaca Counties, slightly north of west to the Mississippi River. This area is not so fertile as are the other regions, but is enriched in places by a covering of loess and also by muck and peat deposits.

In general the southern half of Wisconsin was a non-forested area. The prairies, while small, were numerous and occupied a considerable area. The oak openings did not present the obstacles to pioneer farming that the heavily wooded areas did, and at the same time they were free from the serious objections which held in the case of the prairies. The area under cultivation in 1836 was about 3,000 or 4,000 acres, and the amount of grain produced was a little over 40,000 bushels, mostly corn and buckwheat.[7] The census of 1840 gives the wheat production as 212,116 bushels; oats, 406,514; corn, 379,359; and potatoes, 419,608. 135,288 pounds of maple sugar were made.

In a review of the agricultural possibilities of Wisconsin in 1840, a writer in *Hunt's Merchants' Magazine* speaks of the culture of tobacco and hemp and the production of pork, beef, and wool for the eastern market, but states that Wisconsin was to derive its greatest wealth from the raising of wheat.[8]

Wheat was raised at first chiefly on the oak openings, the prairies being occupied only in a fringe around the edge until late in the 1840's.[9] There were several reasons for this avoidance of the prairies. (1) After it was broken the prairie sod had to be allowed to rot for a season before it gave returns of much account. The oak openings could be cultivated with greater ease and produced a crop the first season. (2) It was said that the prairie soil was so rich that it produced a too rapid growth of stalk and rendered the grain liable to rust.[10] (3) Winter wheat, which was used almost exclu-

[7] Dwinell, S. A.: Wisconsin As It Is and As It Was, p. 3.
[8] *Hunt's Merchants' Magazine*, Vol. X, p. 554.
[9] Hibbard, B. H.: History of Agriculture in Dane County, p. 125.
[10] *Hunt's Merchants' Magazine*, Vol. X, p. 554.

sively at first, was reasonably safe from being winter-killed in the well-sheltered fields of the woods and oak openings, while "on the prairies it uniformly failed."[11] The introduction of spring wheat permitted the utilization of the prairies. The prairies were not popular, until the high prices of 1855, said to be caused by the Crimean War, overcame all prejudice against any land that could raise wheat. They were then taken up rapidly. A letter dated at Rock Prairie, February, 1845, relates the experience of a farmer who bought 80 acres of prairie land and paid for it with the first crop of wheat, even though he hired all the work done. The items of the transaction are as follows:

80 acres of land at $1.25	$100.00
Fencing	230.00
Breaking	160.00
Seed	75.00
Harrowing	90.00
Harvesting	150.00
Total	$805.00

The first crop yielded 26 bushels to the acre, which, deducting one-tenth for threshing, gave a yield of 1,872 bushels. This sold at 45 cents a bushel, or $842.40, giving a gain of $37.40.[12] This was by no means an uncommon experience. Where a man did the work himself his profits were larger, often amounting to several hundred dollars. By 1849 the wheat acreage was 306,132, with a yield of 4,282,131 bushels. Dodge, Dane, Rock, and Walworth Counties were the heaviest producers, raising 50 per cent. of the crop. No wheat was grown north and west of the Fox and Wisconsin Rivers, for, as has been shown, this country was practically unoccupied and unknown at this time, except by a few lumbermen.

Most of the wheat was sold in the home market. The southeastern section supplied the flood of immigrants then coming in, and who were shortly to become wheat producers. The surplus was sent to the lake ports. The Green Bay region supplied the home market and the demands of the lumbering population to the north, sending what was left east by water. The area in the southwestern part of the state furnished wheat to the lead miners, the military posts, Indian reservations, fur trading stations, and sent the surplus to St. Louis.[13]

[11] Hibbard, B H.: History of Agriculture in Dane County, p. 125.
[12] Sketches of the West, p. 23.
[13] Thompson, J. G.: Wheat Growing in Wisconsin, *Bull. Univ. Wis. No. 292*, p. 16.

The first load of wheat entered Milwaukee in 1839 and was sold for 50 cents a bushel. The first wheat was shipped from Milwaukee on July 8, 1841, on the schooner *Illinois*. It took three days to load the cargo of 4,000 bushels.[14] In 1849 Milwaukee, Kenosha, and Racine shipped 2,678,045 bushels of wheat and 183,557 barrels of flour, which is equivalent to a total of 3,504,000 bushels of wheat.[15]

All this wheat was brought to market by wagon. Not until 1851 was any railroad completed and that only a short line between Milwaukee and Waukesha. There were some plank roads extending west from Milwaukee and Racine (Fig. 12, Chap. III, p. 593), but they were not much better than the common dirt roads, which were almost or quite impassable in the spring. Farmers far removed from the Lake or Mississippi ports suffered greatly from lack of transportation facilities. Their wheat and other produce was often worth scarcely more than it cost to get it to market, while the goods they required were very expensive.

In a book published in 1855 an estimate was made of the comparative value of a ton of wheat and a ton of corn at given distances from market as affected by the cost of transportation by railroad or by wagon. The following gives a few items of the table:[16]

MILES TO MARKET	BY RAILROAD		BY WAGON ROAD	
	WHEAT	CORN	WHEAT	CORN
10	$49.50	$24 75	$49.50	$25.75
50	48.75	24.00	42 00	17.25
100	48.00	23.25	34.50	9.75
150	47.25	22.50	27 00	2.25
170	46.95	22 10	24.00	0.00
300	45.00	20.25	4 50	0.00
330	44.55	18.80	0.00	0.00

Closely following the first success in wheat growing, came failure. There were some light yields in the early 1840's on land that had been cropped for several years, but between 1847 and 1853 all varieties of wheat failed. Farmers were confronted by serious financial difficulties, for they had relied on their wheat to furnish them with other necessaries and to pay for their farms. Remedies of various sorts were suggested by the papers and books published at that time. Farmers were urged to choose sheltered places for planting, so as to protect the wheat from killing frost; to sow the seed in drills; to try other crops than wheat; to till the ground thoroughly; to rotate their crops; to raise more stock; and not to

[14] *Mag. West. Hist.*, Vol. VI, p. 315.
[15] Thompson, *op. cit*, p. 16.
[16] Gregory, John: Industrial Resources of Wisconsin, p. 236.

buy more land than they could pay for, because interest was very high.[17]

The high price of wheat in 1855 and the years immediately following, held the farmers to the one crop. An occasional good yield compensated for several poor ones, and they were always hoping for a good year. In 1858 there were shipped from the Lake Michigan ports 329,330 barrels of flour and 5,216,280 bushels of wheat. About five-sixths of it went through Milwaukee. The other grain shipments were small, 674,786 bushels of oats and 115,967 bushels of barley being the largest. In April, 1860, the price of wheat was $1.15, but it fell as soon as the large crop of 1860, which was nearly 30,000,000 bushels, came on the market. From 1864 to 1866 inclusive, the cinch bug destroyed the crop. In 1864 the yield was only 14,000,000 bushels. In 1865 and 1866 it was 20,300,000 bushels. The acreage of wheat increased from 1,062,097 in 1860 to 1,743,076 in 1868, and as the secretary of the Wisconsin State Agricultural Society stated in his report of that year, "so long as the present high prices ($1.75 to $2.00 a bushel) continue there will continue to be profit in wheat and farmers will continue in the old way."

The wheat crop was the main reliance of the farmers until about 1875, when the acreage was 1,800,000 and the product was 25,000,000 bushels. After that date the production declined steadily until in 1909 the crop was only 2,634,710 bushels from 140,630 acres, 63,488 bushels being durum wheat raised on 3,369 acres. The early importance and rapid spread of wheat raising was due to several causes. (1) The favorable climate and natural adaptability of the soil were fundamentally important. (2) Its cheapness, abundance, and fertility encouraged poor people to take up land. A farm could be paid for in a year or two if the wheat crop was good, as it was likely to be on freshly broken ground. The fact that wheat did better on new soil was a temptation to the farmer to take up unbroken land as often and in as large quantities as possible. (3) The introduction of machinery reduced the amount of hand labor necessary and also the expense of crop production. (4) When railroads were built into the state the wheat had easy access to the eastern markets. This increased the value of the crop. (5) Wheat was always in demand and commanded a ready sale. Receipts for wheat stored in warehouses were often used as money.[18] Money was scarce among the farmers, and this system was a great convenience. (6) For a long time it was generally believed that the

[17] Gregory, *op. cit.*, p. 61

[18] Thompson, *op. cit.*, p. 25.

climate of Wisconsin was too cool for corn to be cultivated profitably. Furthermore, corn was too bulky and too cheap to be shipped with profit, and would have to be converted into beef, pork, and mutton. (7) Stock raising required money, of which the settlers, as a rule, had but little. It is estimated that at the present time it costs about $20 an acre to equip an ordinary grain farm, $40 an

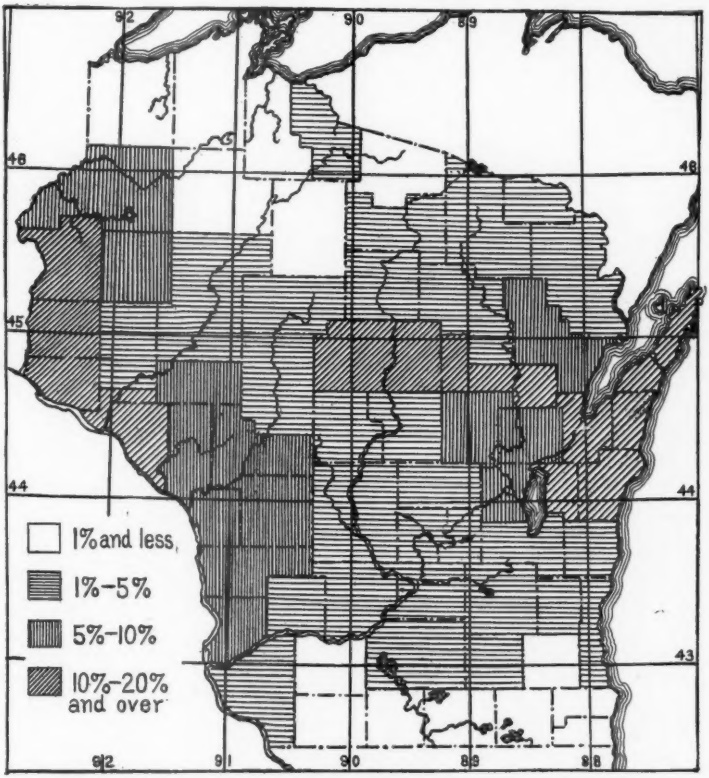

FIG. 26—Percentage of Improved Land in Wheat in 1899. Scale, 1:4,500,000.

acre for a hay farm, $70 an acre for a hog farm, and from $100 to $300 an acre for a first-class dairy farm.[19] While the costs were not the same as now during the period under discussion, the differences were probably of similar magnitude. Exploitative farming requires but a small degree of intelligence on the part of the farmer. On the other hand, any form of live stock farming requires more con-

[19] Spillman, W. J.: Agricultural Production, Rept. Natl. Conserv. Comm., Vol. 3, p. 260.

stant attention, and a much greater degree of intelligence. It is natural, then, that the pioneer farmers should have continued in the less strenuous if more disastrous system to which they were accustomed. How persistently the habit of wheat raising clung to the Wisconsin farmer may be seen in Figures 26 and 27. These maps show a decided decrease over most of the state between 1900 and 1910 in the percentage of improved land devoted to wheat.

The decline of wheat raising was due in part to (1) what was called soil exhaustion, which came as a result of the single cropping. The continued cropping of a piece of ground to the same plant exhausts the soil of the elements which that plant requires in greatest abundance. When rotation of crops is practiced, different elements are drawn upon and the balance of plant food is more nearly maintained. A change of crops also improves the physical condition of the soil, discourages insect pests and prevents other unfavorable conditions. (2) Careless cultivation was also a fault of the early farmer. Plowing was usually shallow and pulverizing imperfect. (3) For many years no fertilizers were used. When the barnyard manure had accumulated to such an extent that it became inconvenient the farmer usually moved his barn, but he did not return the manure to the land where it would have given him a good profit. Straw stacks were commonly burned. This was especially true of the American farmer. The foreigners, however, had learned the value of fertilizers in their old homes and often made use of their knowledge. The secretary of the Wisconsin State Agricultural Society reported in 1869 that "there is less of moving barns to avoid manure piles and of burning straw stacks, but there is still poor farming." (4) About 1860 the cinch bug reached Wisconsin, and while its ravages were probably most disastrous in 1864, it was a menace at any time. (5) The quality of the wheat, which was high during the early days, depreciated greatly and could not compete with the best grades from other regions. (6) The great wheat fields of Minnesota and other western states produced so much wheat of such good quality that in Wisconsin it ceased to be a profitable crop. (7) The railroads reached the western fields in the decade between 1875-1885, and brought their product into the eastern market almost as readily and cheaply as they did the Wisconsin grain.

With the early and repeated failure of the wheat crop, some of the more intelligent farmers turned to diversified farming. They introduced other crops, such as barley, corn, oats, and hay, and also began to accumulate live stock.

Barley was raised at first chiefly in the counties near Milwaukee. In 1850 Waukesha produced 52,369 bushels, or more than one-fourth of the total crop. Walworth was next with 31,599 bushels. In 1860 Rock County took the lead with 102,378 bushels, which was more than one-seventh of the total crop. Dodge County came next with 83,915 bushels. The production of barley did not in-

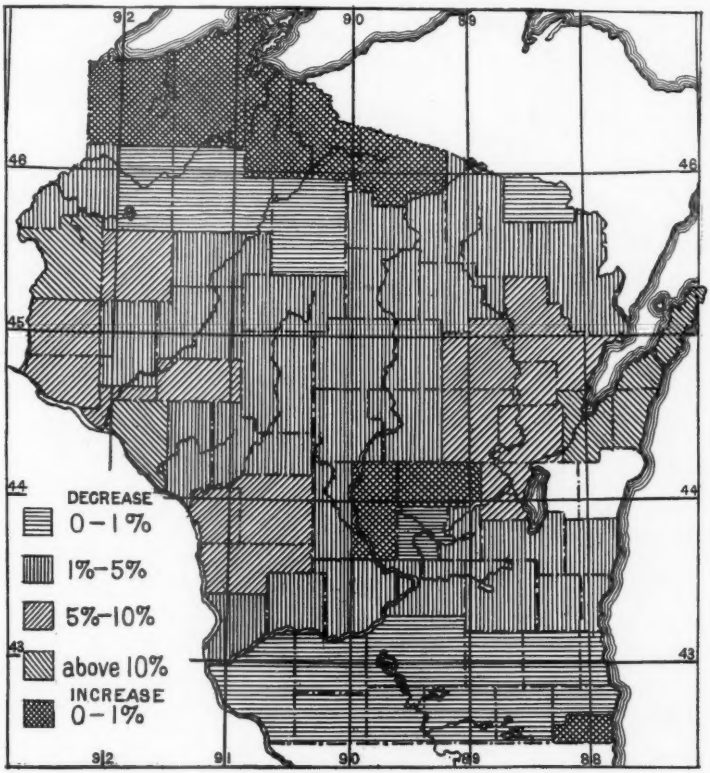

FIG. 27—Change in the Percentage of Land in Wheat from 1899 to 1910. Scale, 1:4,500,000.

crease very rapidly until after the decline of wheat raising. In 1870 the total yield was 1,645,019 bushels; in 1880 it was 5,000,000; in 1890, 15,000,000, and in 1909, 22,156,041. A large part of this product went to the Milwaukee breweries, some was used for feed on the farms, and the rest was exported.

The corn crop has increased rapidly with the development of

diversified farming. In the report of the Secretary of the Wisconsin Agricultural Society for 1872-1873, he remarked on the large yield and excellent quality of the corn, and added: "This crop must ever be the leading crop of the state for the reason that it not only furnishes excellent and nutritious food for man, but is the crop upon which the farmer must rely to fatten his cattle, hogs, and sheep."

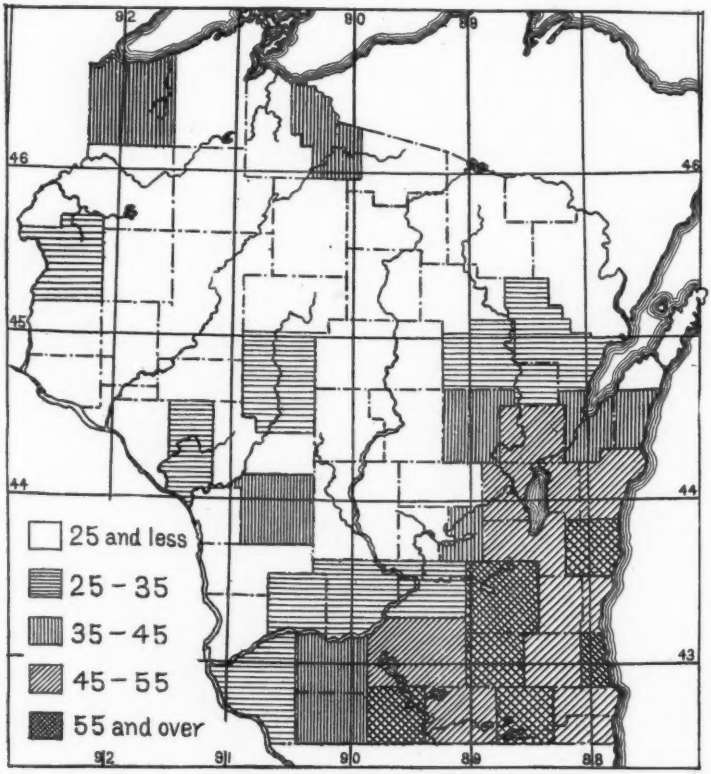

FIG. 28—Numbers of Dairy Cows per Square Mile of Farm Land in 1899. Scale, 1:4,500,000.

He expressed the opinion that it is less exhaustive to the soil than any other general farm crop. In 1869 the yield was 15,033,998 bushels. In 1899 it was 53,309,810 bushels. The yield had increased 3½ times in three decades. In 1909 it was 50,000,000 bushels.

Perhaps the most striking development in agriculture has been

along the line of dairy farming. In 1850 Wisconsin had only 64,339 milch cows and 80,000 other cattle. In 1856 and 1857 large quantities of butter were brought into Milwaukee from New York and Ohio. Part of it was consumed there and the rest shipped into the interior of the state. In 1858 Milwaukee exported butter for the first time.[20] In 1905 there were 1,237,910 milch cows in the state,

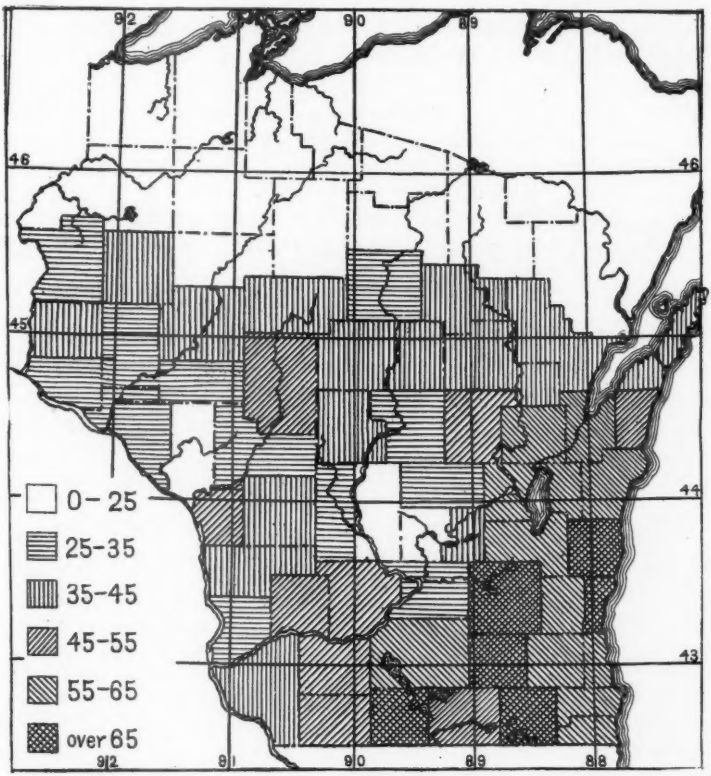

FIG. 29—Number of Dairy Cows per Square Mile of Farm Land in 1909. Scale, 1,4:500,000.

producing 100,418,960 gallons of milk yearly. A part of this was manufactured into 34,620,368 pounds of butter and 1,974,830 pounds of cheese. In 1909 the state had 1,471,591 cows and manufactured 105,307,357 pounds of butter and 145,171,035 pounds of cheese. The growth of the dairy industry was especially rapid

[20] *Hunt's Merchants' Magazine*, Vol. 41, p. 310.

between 1900 and 1910, in the north-central and western parts of the state (Figures 28 and 29). In 1900 few of these counties had 25 cows to the square mile of farm land. In 1910 Adams, Marquette, and Trempealeau Counties were the only ones with so low an average, while Sauk, Richland, La Crosse, Waupasa, Clark, and Kewaunee Counties had from 45 to 50 cows to the square mile of farm land.

The number of creameries and cheese factories increased rapidly between 1900 and 1905. Shawano County had an increase of 40 factories and 4 creameries; Marathon, 9 factories and 4 creameries; Clark, 10 factories and 11 creameries.[21] Between 1905 and 1909 there was a total increase of 238 cheese factories and an increased product of 5,280,903 pounds of cheese. The actual number of creameries was decreased by 52 in the same time, but the amount of butter manufactured was increased by 16,902,973 pounds.[22]

Dairying was revolutionized by the Babcock Milk Tester, which was invented by Dr. S. M. Babcock of the University of Wisconsin in 1890. This invention makes it possible to determine with accuracy the amount of butter-fat contained in milk. Milk is sold according to the amount of butter-fat it contains, thus eliminating fraud and encouraging the keeping and breeding of high grade dairy cows. In 1899 and 1905 Wisconsin ranked second in the production of butter, cheese, and condensed milk. It ranked fourth in 1899 in the number of dairy cows and in the amount of milk produced.

With the increase in the number of domestic animals came an increase in the importance of the hay crop. In 1909 the counties of Dane, Grant, Dodge, Iowa, Lafayette, Vernon, Marathon, Fond du Lac, St. Croix, Manitowoc, and Rock, produced one-fourth of the total quantity. Some of the smaller eastern counties devoted a larger percentage of the farm land to hay, as, for example, Racine had 39 per cent. of the farm land in hay, Milwaukee 29 per cent., Ozaukee, Keewaunee, Door, Jefferson, 20 per cent., Waukesha 24 per cent. Most of the north central counties devote from 10 to 17 per cent. of their total farm land to hay.

Wisconsin is well adapted to the dairy business for several reasons. The cool climate and pure water furnished an abundance of cheap ice, and make the production and preservation of butter and cheese relatively easy. The grasses are very nutritious, whether

[21] Russell, H. L., and Boer, U. S.: Development of Factory Dairying in Wisconsin, *23d Ann. Rept. Agric. Exp. Sta. Univ. Wis.*, p. 104.

[22] *Univ. Wis. Agric. Exp. Sta. Bull. No. 210*, pp. 28, 29, 30.

in the form of green pasture or hay, and they are also very abundant. The corn crop is sufficiently large to furnish food in the form of both grain and silage. Root crops grow readily and can be made to furnish fresh food over winter.

Two crops that are of great importance locally are tobacco and cranberries. Tobacco was raised by the Indians when the white men came to Wisconsin. The latter began its cultivation probably as early as 1838.[23] The fact that it represented large value in small bulk recommended it to a few, but its cultivation was very limited for years. In 1850 the yield was reported as 1,268 pounds, and in 1860 as 87,340 pounds, of which Walworth County produced 26,400 and Rock County 23,340. When the value of the Wisconsin leaf

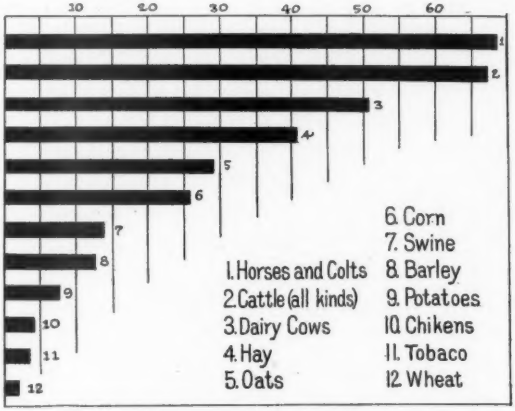

FIG. 30—Value (in Million Dollars) of Farm Products in 1909.
(*Erratum*. Captions 10 and 11 should read "Chickens" and "Tobacco," respectively.)

as a wrapper was recognized a considerable demand was created for it. Another impetus was given to the industry by the scarcity of tobacco during the Civil War. In 1870 there was a yield of 906,813 pounds, of which Rock County produced two-thirds and Rock and Dane Counties together produced eight-ninths. In 1909 the yield was 46,909,182 pounds from 40,000 acres, valued at 3.8 million dollars.

The quality of the tobacco varies greatly with the soil. Calcareous, sandy soil produces the choicest tobacco. It usually produces a leaf that is light and uniform in color, thin, silky, and elastic. The plant matures nearly a week earlier than on other soils. The

[23] Hibbard, B. H.: Agriculture in Dane County, *Bull. Univ. Wis. No. 101*, p. 155.

clay soils are apt to yield a coarse, thick leaf of uneven color. The lighter the clay, the better the tobacco. The more sandy prairie soils produce a good quality of tobacco, but the clay prairie soils are unfitted for this crop. Good crops of tobacco require rich fertilization of the soil at a considerable cost. Both barnyard manure and commercial fertilizers are used. The tendency of many tobacco

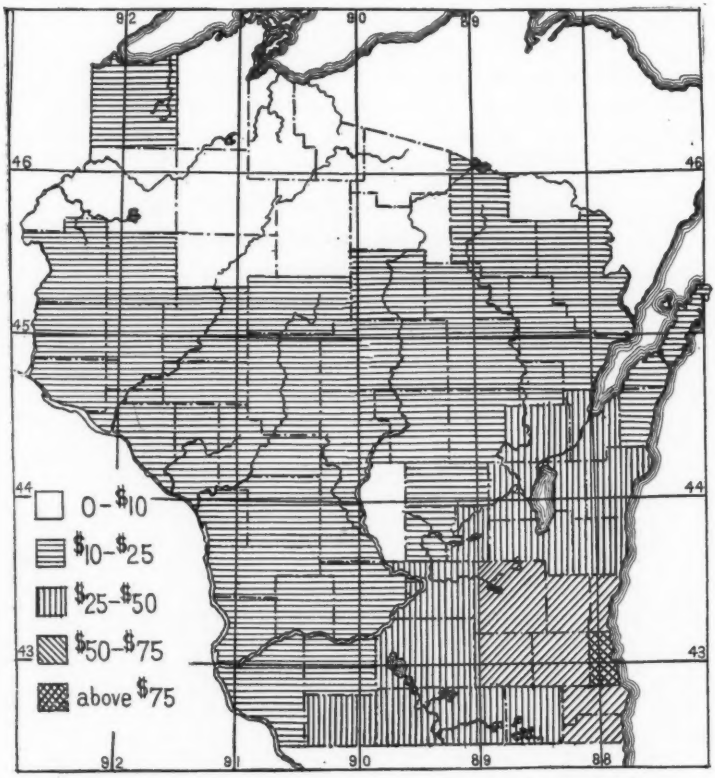

FIG. 31—Average Value of Farm Land per Acre in 1899. Scale, 1:4,500,000.

growers is to concentrate all the fertilizers on the tobacco fields at the expense of the other farm crops.

The cranberry is indigenous in Wisconsin and is found chiefly in the marshes north and west of the Fox and Wisconsin Rivers. In the early days the Indians gathered and marketed the crops. As the white men extended their settlements into the region of the

cranberry marshes, they took up the industry. In 1858 7,744 barrels of this fruit were shipped from Milwaukee. Gradually a system of irrigation and drainage was developed by which the marshes could be flooded when necessary for the growth of the plant and as a protection against frost and insects.

The yield of cranberries in 1870 was 11,000 barrels, valued at

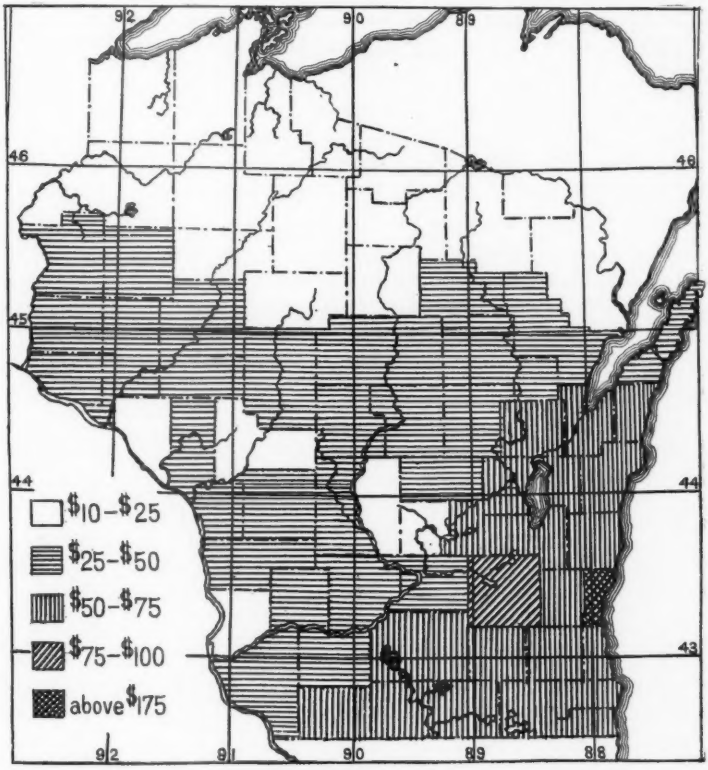

FIG. 32—Average Value of Farm Land per Acre in 1909. Scale, 1:4,500,000.

$120,000. In 1900 Wisconsin ranked third, with a yield of 111,098 bushels. This was 11.2 per cent. of the total crop of the United States. There were reported 5,821 acres of cranberry bog with an average yield of 19 bushels. The average for Massachusetts was 117 bushels per acre. The low average yield of Wisconsin was due to the inclusion in the total average of new bogs not yet bearing;

to injury to the crop by blight, frosts, insects, and other causes; and to lack of care and cultivation. Jackson, Waushara, and Wood Counties produce the bulk of the crop.

Cranberry culture probably will not be a permanent occupation in Wisconsin. As population increases, the marshes now supporting this plant will be of more value drained and planted to crops having a higher food value.

The comparative value of live stock and crops in 1909 is shown in Figure 30. Horses rank first, cattle, including dairy cows, second, and dairy cows third. Hay is the most valuable cultivated crop. Oats and corn rank fifth and sixth respectively, while wheat, which was once the mainstay of the farming population, is of less value than either tobacco or chickens.

With increase in population and more complete utilization of land the average value per acre of farm land increases. Figures 31 and 32 show the average value per acre of farm land for 1899 and 1909. There has been an increase of from $7.50 to $33.05 an acre except in the case of Douglas County, where the average increase was only $3.41 an acre. The greatest actual increase occurred in the older counties. Green, Lafayette and Dane Counties show an increase of over $30 an acre, Brown, Calumet, Chippewa, Dodge, Door, Rock, and Walworth of over $20 an acre.

On the other hand, the percentage of increase on all farm property is much greater in the newer counties. Forest County shows an increase of 709.3 per cent.; Bayfield, 421.4; Washburn, 408.4; Vilas, 359.5; Sawyer, 312.9; Douglas, 287. Of the older counties Sauk had the remarkable increase of 312 per cent., but Milwaukee had only 11.4 per cent.; Jefferson, 35.8; Washington, 28.3; Waukesha, 33.4; and Grant, 61.3.

The influence of a city on property values is apparent near Milwaukee and in Calumet, Winnebago, Brown, and Outagamie Counties which contain the manufacturing towns along the lower Fox River.

(To be concluded)

THE EXCURSION OF THE INTERNATIONAL PHYTOGEOGRAPHERS ABOUT NEW YORK CITY

Under the auspices of the central committee for the survey and study of British vegetation, the plant geographers of the world made an excursion through the British Isles in 1911. The excursion was such a success that an international excursion of phytogeographers was arranged for this summer through the United States, details with regard to which were published in the *Bulletin* for January (p. 45) and August (pp. 615-616). Two American botanists were instrumental in drafting the program and in making the final arrangements. The preliminary circular was signed by Professors Frederic E. Clements and Henry C. Cowles, who invited American phytogeographers to cooperate, as did their English brethren, in taking charge of the scientific excursionists in different parts of the country.

The first trip was on Sunday, July 27th, to the Hempstead Plains of Long Island, about twenty miles east of New York City. The area studied is a natural prairie about fifty square miles in extent, immediately south of the terminal moraine of the Pleistocene ice sheet. The best description of this prairie by Dr. Roland M. Harper appeared in the *Bulletin* (Vol. 43, 1911, pp. 351-360). The leaders of the party, Messrs. Norman Taylor and Henry Hicks, met the phytogeographers at Westbury Station on their arrival from Brooklyn, where the morning had been spent in visiting the Brooklyn Botanical Garden, under the guidance of the director, Dr. C. Stuart Gager.

The next morning the members of the excursion assembled at the ferry station of the New Jersey Central Railroad for a trip across the pine barrens of New Jersey under the leadership of Professor J. W. Harshberger and Dr. Witmer Stone. The route to Barnegat, 90 miles south of New York, followed the New Jersey coastal plain, mostly near the sea. The phytogeographers caught glimpses of the vegetation of the stream banks, salt marshes, deciduous forests and tidal estuaries, as the train sped southward. At Barnegat the botanists, thirteen in number, visited the extensive salt marshes to the east of this old fishing center. Here the party had an opportunity to study the pure associations of *Spartina patens*, *Juncus Gerardi*, and other characteristic salt-loving plants.

Late in the afternoon before a thunder-storm broke, the members of the party took conveyances to Warren Grove, where the night was spent. The drive to Warren Grove after the rain was a profitable one, for it enabled the foreign members to study the reproduction of the pine forest after the destructive fires which not infrequently sweep across the country. The new growth of young oaks and pines was found to be so thick as to almost choke the road, so that showers of water wet the passengers as the branches of the low trees swept along the sides of the two wagons which carried the party. On reaching Warren Grove, the party was accommodated in two farm houses.

An early start was made on Tuesday morning, July 29th, across the Lower Plain, where the depauperate growth (nanism) of the pitch pine (*Pinus rigida*), laurel (*Kalmia latifolia*), black-jack oak (*Quercus marylandica*), bearberry

(*Arctostaphylos uva-ursi*) associated with the peculiar cushions of the low shrub *Corema Conradii* elicited great interest. The plain of rolling hills was crossed in a northwestern direction to the Sym Place. En route taller pine timber was studied with the dominant pitch pine and associated secondary trees (mostly oak) and shrubs, including several species of blueberries and huckleberries. The subordination of the tolerant trees to the intolerant pines was remarked on the way. Several cedar swamps were entered, where the foreign members had a chance of seeing the close stand of the white cedar (*Chamaecyparis thyoides*) and associated shrubs, such as sweet bay (*Magnolia virginiana*), poison oak (*Rhus vernix*) and laurel (*Kalmia latifolia*). In an open swamp, or wet savanna, along the Oswego River several rare New Jersey plants were found, such as *Schizaea pusilla, Abama Americana, Tofieldia racemosa, Gyrotheca tinctoria.* Leaving the Sym Place, the plant geographers had an opportunity of visiting several large cranberry bogs where the systematic cultivation of the cranberry was explained.

The party finally reached Chatsworth (Shamong), where it divided, Philadelphia members returning home. Those who returned to New York attended a general meeting on Wednesday afternoon at the New York Botanical Garden under the leadership of the director, Dr. N. L. Britton. Some of the botanists had previously visited Columbia University, where Dr. Robert A. Harper met them and conducted them about the University and later to the Garden in Bronx Park. On July 30 the members started on their transcontinental trip.

University of Pennsylvania. JOHN W. HARSHBERGER.

GEOGRAPHICAL RECORD

NORTH AMERICA

Controversies over the Rio Grande Waters. Water-Supply Paper 308, issued by the U. S. Geological Survey, contains records for 1911 of the discharge of the Rio Grande and its principal tributaries, together with that of Brazos River and Colorado River of Texas. The amount of water in the streams of the Rio Grande basin, which covers the greater part of New Mexico, large areas in southern Colorado, and a considerable territory in Texas and old Mexico, is of unusual importance to that region because it is for the most part an arid country, entirely dependent on its water supplies for irrigation. It is alleged that an unfair diversion of the water in both Colorado and New Mexico has resulted in the destruction of large agricultural values in Mexico. Certain issues have also arisen between the States of New Mexico and Colorado by reason of the allegation made by the people of New Mexico that a disproportionate part of the Rio Grande water originating in Colorado is diverted in that State to the detriment of interests in New Mexico. These international and interstate complications are now being investigated and the results of the streamflow measurements in this Geological Survey report constitute a part of the evidence that will be used in final decisions.

Life and Crop Zones in New Mexico. The Bureau of Biological Survey of the Department of Agriculture has issued "Life Zones and Crop Zones of New Mexico" (No. 35, North American Fauna) in which Mr. Vernon Bailey gives a survey of the biological investigations undertaken in that state. The transcontinental life zones are represented by six well-defined types: The Lower Sonoran, or the arid subdivision of the Lower Austral Zone, indicated by the mesquite and extending over the southern valleys of the Pecos, Rio Grande and Gila Rivers and the low plains of the southwestern corner of the state; the upper Sonoran corresponding to the upper Austral zone, represented by the nut pine and juniper and occurring in the plains and foothill country; Transition, the zone of yellow pine, covering the middle mountain slopes of the high ranges; the higher mountain slopes reveal the Canadian or the zone of spruce and fir; the Hudsonian or zone of dwarf spruces is found as a narrow belt of scrubby timberline trees around the high peaks; finally many of the summits of the Sangre de Cristo Range are capped by the treeless Arctic-Alpine Zone. A map in colors shows the distribution of these zones.

Map of the Niagara Gorge. A map of the Niagara river (1:12,000) from Lewiston to the mouth of the Welland River, has been issued by the U. S. Geological Survey to accompany the recently published Niagara folio. This map was surveyed in cooperation by the United States and Canadian Geological Surveys. It was compiled originally to accompany Guide Book No. 4, entitled "Excursions in Southwestern Ontario," prepared by the executive committee of the XIIth International Geological Congress.

Electric Storms in Western Kansas. The electric storms of western Kansas are distinct from thunderstorms, and from the magnetic disturbances during auroral displays, as stated by Mr. S. D. Flora. They occur at irregular intervals in practically all parts of Kansas west of the 101st meridian. In the northern counties they have been experienced as far east as the 99th meridian. During these "storms" metallic objects which are insulated from the earth are highly electrified. Barbed wire fences and stoves give severe shocks to anyone who touches them. The handles of cooking utensils not infrequently have to be covered with cloths to avoid the discomfort of the electric discharges. Cases are reported of herds of cattle having been seen at night time with "balls of fire as large as marbles" on their horns.

These electric storms are never associated with precipitation. The air is usually dry, and drying winds are common during their occurrence. The season of maximum frequency is late spring and early summer. Few, or none, are noted in winter. The high winds which accompany these storms are usually from the northwest, and the air is generally filled with dust. The storms occur in streaks, from a few feet to several miles in width, and seldom last more than a few hours. There have been cases when the electrical phenomena extended over several days, disappearing as the wind decreased in the night and reappearing with the increasing wind velocity of the next day. The general effect of these storms upon human beings is depressing, and there is a tendency to headache. Crops show similar effects to those of a killing frost, the foliage rolling up and dropping off. These effects, may, however, very likely be due to the dry hot winds, and not to the electrical disturbances. (*Monthly Weather Rev.*, Vol. 40, 1912, No. 6.) R. DEC. WARD.

CENTRAL AMERICA AND WEST INDIES

Climatology of the Panama Canal Zone. A very complete discussion of the "Hydrology of the Panama Canal," by Caleb Mills Saville, M. Am. Soc. Civ. Eng., formerly Assistant Engineer of the Isthmian Canal Commission, is published in the *Proceedings of the American Society of Civil Engineers*, Vol. 39, No. 1, 1913, pp. 3-115. This paper may be considered as an extension of the records previously discussed by Mr. A. P. Davis and Gen. Henry L. Abbot, U. S. A. Full tabulations of the data under discussion, with many diagrams and maps, serve to make Mr. Saville's report of unusual interest and value. Those who are in search of information regarding the climatology and hydrology of the Canal Zone will here find abundant material. The paper will naturally appeal most to engineers, and the fact that it is published in an engineering journal will probably prevent many meteorologists from seeing it. It is, however, a monograph which is one of the more important American contributions to climatology of the last year or two.

R. DEC. WARD.

ASIA

Climatology of Japan. The difference between the climates of western and central Japan is so great that these districts are distinguished by the two names "shady side" and "sunny side" respectively. While western Japan is having a long and severe winter, the central provinces, bordering the Inland Sea, are having dry and comparatively mild weather. The two regions are separated by mountains, and the climatic controls in the two cases are distinct. While the winter climate of central and southern Japan depends on the southwest monsoons, that of the western coast is directly related to the barometrical conditions of northern China. When the records of the mean daily temperatures at Tientsin are compared with corresponding records taken at Hamada and Sakai, representing western Japan, the results show a striking similarity, especially as regards the observations taken at an interval of two days between the two areas. (*Journ. Met. Soc. Japan*, Vol. 31, No. 9, 1912.)

R. DEC. WARD.

Pilgrim Travel by Sea to Mecca. The Sanitary Administration of the Ottoman Empire has issued a statistical statement of the number of Mohammedan pilgrims who traveled to Mecca via ports on the Red Sea during the Mohammedan year 1330, which corresponds almost exactly to the calendar year 1912. These pilgrims do not include the thousands who travel to Medina and Mecca via the Hedjaz Railroad and other overland routes. The number of pilgrims arriving by sea was 83,995, of which 83,295 came to Jedda, 688 to Yambo, and 12 to El-Wedj. One hundred and ninety-eight vessels were engaged in carrying pilgrims, and of these 134 were under the British flag, 22 Russian, 13 Dutch, and 29 Ottoman.

The largest number of pilgrims came from the Far East, which includes India, the Malay Archipelago, Sumatra, Java, and Japan. Some 15,000 came from Bombay, 9,500 from Singapore, and 12,000 from Batavia. The Indian

Ocean, Gulf of Oman, and the Persian Gulf regions contributed 4,823 to the total, about 1,000 each being credited to the ports of Bassora, Bushire, and Bahrein. From the Arabian and African coasts of the Red Sea there were 22,108, chiefly from Suez (16,039) and Suakin (5,520). From cities or ports on the Mediterranean the number was 6,741, Constantinople furnishing 2,299, Smyrna 1,615, Beirut 1,165, and Tangier 740. Finally, the three Russian ports of Sebastopol (7,692), Odessa (2,761), and Novorossisk (20), make a total of 10,473.

EUROPE

Widening the Kaiser Wilhelm Canal. In consequence of the rapid increase in traffic and in the tonnage of both merchant vessels and battleships it has become necessary to widen the Kaiser Wilhelm Canal, which connects the North Sea with the Baltic between the lower Elbe and Kiel Harbor. Opened to traffic in 1895 with a bottom width of 72 feet, a surface width of 213 feet and a depth of 29½ feet, after enlargement, which will be completed in 1915, the canal will be 144 feet wide at the bottom, 354 feet wide at the surface and 36 feet deep, as shown on the accompanying diagram. Traffic will not be interrupted by the change.

The table below shows that the enlarged Kaiser-Wilhelm Canal, although joining only two minor arms of the sea, may well bear comparison in size with such world-important arteries as the Suez and Panama Canals.

	SUEZ	PANAMA	KAISER WILHELM
Length	100 miles	50 miles	61 miles
Bottom width.....	126 ft.	300 ft. (min.)	144 ft.
Surface width.....	230 ft. (min.)	...	354 ft.
Depth	29½ ft. (min.)	51 ft. (min.)	36 ft.

The importance of the Kaiser Wilhelm Canal is shown by the fact that it is used annually by more than 40,000 vessels with a tonnage of more than 7,000,000 tons. As to the economy of time and distance in traffic between the Baltic and the North Sea a glance at the map will show. This shortening of distance to the Baltic is felt by all ports on the English North Sea coast south of Newcastle-on-Tyne. From Hamburg, the Baltic can be reached through the Canal in 25 instead of 80 hours *via* the Skager Rak. The avoidance of the latter route is advisable not only because of the longer distance it involves but also because of the frequency of its storms, which used to exact a toll of more than 100 vessels, many lives and millions of dollars worth of cargo annually.

Cross Section through the Kaiser Wilhelm Canal.
(From the *Geogr. Anzeiger*, Vol. 14, 1913, No. 4.)

The above is taken from a note in the *Geographischer Anzeiger* (Vol. 14, 1913, No. 4, p. 90) with the exception of the dimensions of the Suez and Panama Canals. These, particularly those of the Panama Canal, are greatly understated, the depth of the Panama Canal, for instance, being given as 29½ feet, whereas its minimum depth is actually 41 feet and its average depth 45 feet. The dimensions of the enlarged Kaiser Wilhelm Canal have not been subjected to a similar scrutiny. It is taken for granted, however, that they are correct.

POLAR

Arctic

Captain Koch's Expedition Across Greenland. The *Geographical Journal* (Vol. 42, 1913, No. 3, p. 299) reports that the Danish Expedition under Captain Koch which set out in June, 1912, to cross the inland ice of Greenland at about its widest part has accomplished its purpose in the face of considerable difficulties. It is reported from Copenhagen that the party reached the west coast at Prövenabout 40 miles south of Upernivik, when just at the end of its resources. After being landed on the ice on the north-east coast on July 24, 1912, the party made an unsuccessful attempt to reach Queen Louise Land (due west of Cape Bismarck), and Captain Koch therefore decided to winter on the inland ice. During a sledge expedition to Queen Louise Land, at the end of October, the leader had the misfortune to break his leg through falling into a crevasse, and was laid up for three months. During the winter the temperature was generally 50° below the freezing-point (Centigrade?). Only in March could sledge work be resumed, and on April 20 the expedition started with five sledges and five horses (the rest had previously been slaughtered) to cross the ice to the west coast. During the first forty days the weather was extremely bad. On July 11 the last horse but one had to be killed, and on the next land was sighted. The food now gave out, and, the weather being extremely bad, the party remained for thirty-five hours without food under the shelter of a rock. Too exhausted to proceed, the explorers killed their dog, and were about to eat the flesh when they saw a boat on the fiord east of Prövenby means of shots and signals they were able to attract the attention of those on board, among whom was the owner, Pastor Chemnitz, by whom they were taken to Prövenand hospitably entertained. Both Captain Koch and his companion Dr. Wegener are capable observers, and good scientific results may be expected. Koch's is the fourth crossing of Greenland, the others being those of Nansen, Peary, and De Quervain. It is probably the finest achievement of all, owing to the great width of the inland ice at this latitude. The highest point of the route is said to have been 9,000 feet above sea-level.

Antarctic

British Expedition to King Edward VII Land. *The London Times* (Weekly Edition No. 1915, Sept. 12, 1913) announced that arrangements were being made for an expedition to King Edward VII Land to start in August next year. It will be under the command of J. Foster Stackhouse, who was closely associated with Captain Scott in organizing the voyage of the *Terra Nova.* It is expected that the expedition will sail from the Thames about Aug. 15, 1914, in the steam yacht *Polaris,* which was especially built for ice navigation in accordance with designs approved by an international committee of explorers including Charcot, de Gerlache, and Nansen. The *Polaris* was built at Sandefjord in Norway and her trial trips have been satisfactory. The expedition will be away for twenty months or more. It hopes to make a thorough study of the natural conditions and extent of this land.

METEOROLOGY AND CLIMATOLOGY

Volcanoes and Climate. The eruption of Mt. Katmai has given rise to several investigations of importance in connection with the effect of volcanic dust upon the absorption of solar radiation. Messrs Abbot and Fowle, of the Astrophysical Observatory of the Smithsonian Institution, have published certain conclusions regarding the possible effect of the dust from volcanic eruptions in the past upon climatic changes. Professor W. J. Humphreys, of the Weather Bureau, now presents a paper entitled "Volcanic Dust and Other Factors in the Production of Climatic Changes and their possible Relation to Ice Ages" (*Bull. Mt. Weather Observatory,* Vol. 6, Pt. I, 1913), in which he expresses similar views. The author shows that volcanic dust in the high atmosphere decreases the intensity of solar radiation in the lower atmosphere.

Therefore the average temperature of the earth is decreased. This effect has been clearly traced back to 1750, or to the time of the earliest reliable records. Hence volcanic dust must have been a factor, possibly a very important factor, in the production of many, perhaps all, past climatic changes. Thus another possible cause for past climatic "changes" is added to the already long list. It is a simple cause. It is apparently an effective cause. And, in the great confusion of many other possible causes which have been suggested, simplicity and effectiveness are merits which commend themselves to thinking people.

R. DEC. WARD.

ECONOMIC AND COMMERCIAL GEOGRAPHY

"Cartographic Documents of Economic Geography." The first number of a new quarterly bearing this title is published by Messrs. Kümmerly & Frey under the editorship of Professor C. Knapp of the University of Neuchatel and Dr. G. Michel of the Commercial School of Fribourg. Each number will consist of four or more maps, 14 x 13 inches in size, on which phases of modern industrial and commercial activity will be illustrated. An explanatory text will accompany each map. These sheets will form in time an authoritative atlas of Economic Geography. The annual subscription is 25 frs.; each number, 7.50 frs. The editors aim to offer their readers eventually an exhaustive survey of the natural resources of the earth. In order to impress each map with the stamp of expert information appeals have been made to specialists in various countries. No restrictions are placed regarding the limits of the regions to be described. Political or physical boundaries will circumscribe the data shown according to the requirements of each individual case. Contributions will be printed in French, German or English.

To judge by its first number the publication fills a decided want in the field of economic geography. The titles of the maps are: "Economic Map of Norway, 1913," "Geographical Distribution of the Wool Industry in Germany," "Viticulture in France" and "Railroad Traffic in Switzerland." This last map, the work of the two editors, gives much information regarding passenger and freight traffic by means of appropriate symbols. As the maps will not be bound in the quarterly, they may be classified to meet the convenience of the subscribers.

GENERAL

Memorial to Baron Toll. The *Geographical Journal* (September, 1913) says that a memorial to the lost Russian explorer, Baron E. von Toll, is to be set upon the west coast of Kotelnyi Island in the New Siberia group, the starting point of the explorer and his companions on their last journey into the unknown from which they never returned. Mr. Oskar Iden-Zeller, who was making preparations last spring for a northern expedition with dog sledges, was to take the tablet and affix it to a stone pillar on that island. The tablet shows the traveler's portrait in relief and also contains a suitable inscription.

The XIIth International Geological Congress. For the third time the International Geological Congress was held, in August last, in America. Following the sessions in Washington (1891) and in Mexico City (1906), Toronto was the place of meeting this year. About 700 members were present. The Congress was opened on August 7 in the Convocation hall of Toronto University. The first general meeting was given to a discussion of the world's resources of coal. The estimate of the committee on this topic is 7,397,533 million tons; 4,000,000 million bituminous; 3,000,000 million lignite and the remainder anthracite. The resources of some of the more important countries are estimated as follows in million tons: Canada, 1,234,269; United States, 3,214,174; United Kingdom, 189,535; France, 17,585; Germany, 85,551; Russia, 233,997. The northern hemisphere contains larger reserves than the southern. The choice of the mineral for the next systematic investigation was left to the Executive Committee of the next Congress, which will be held in Belgium in 1917.

In Professor De Margerie's address on the International Geological Map of the World he spoke of Ami Boué's map (Paris, 1845), of Marcou's Geological Map of the World in 8 sheets (1:23,000,000) lithographed in Zürich, of later maps and of the action taken by the Stockholm Congress in assigning the task of preparing the map to the "Commission de la carte Internationale Géologique de l'Europe." He described the various systems of projection best adapted for a geological map of the world on a scale suited for practical purposes. He called attention to the drawbacks of Mercator's projection and referred to the bathymetrical map published by the Cabinet Scientifique de S.A.S. le Prince de Monaco, in which Mercator's projection is used for low and middle latitudes, while the two polar caps are represented on the gnomonic projection, each pole being taken as an independent center of projection. In his opinion this device would also be inconvenient for the purpose of the map. The most practical method, in Professor De Margerie's opinion, is to have geological maps on a scale of 1:5,000,000 compiled separately for each continent, independent centers of projection being selected for each. This plan was suggested by the admirable results obtained in the compilation of the Geological Map of North America issued on the occasion of the Xth International Geological Congress[1] in 1906.

Apart from the fact that it is the land masses which constitute areas of geological interest, it may be well to observe that the reduction in the size of maps compiled in this manner affords notable advantages for purposes of handiness and of economical preparation. With an equatorial scale of 1:5,000,000 a map of the land areas of the world would comprise only 16 sheets, each 1 x 0.60 m. in size for the representation of continental masses as suggested by Professor De Margerie. Of this number Asia would require 6, Africa and South America 4 each, Australia 2.

The subject was discussed by the Committee of the International Geological Map of the World. A proposal for a 1:5,000,000 geological map of the world to consist of 80 sections, each 55 x 75 cm. in size was made. Provisional sheets of this map were submitted to and approved by the Committee which also recommended the adoption of Professor De Margerie's proposal.

Mr. Gentil, the well-known explorer of Morocco, representing the "Université de Paris," gave an instructive account of his investigations of that country. He illustrated his remarks by reference to the 1:2,500,000 map of Morocco which he has compiled in the past ten years. His investigation of northwestern Africa, begun in 1904, is a valuable contribution to the physical geography of the western section of the Mediterranean basin. He emphasized the fact that the High Atlas, with its altitudes attaining 4,200 m. and over, is the prolongation of the Saharan ranges and that its structure is that of the Jura mountains. It extends along the Atlantic coast, dives beneath the ocean to emerge again at the Canary Islands and finally in the West Indies. In this manner the prolongation of the Tertiary system of the Alps is formed.

Northwest of the High Atlas lies the Casablanca flatland, which Gentil has called the Moroccan meseta on account of its analogy with the Iberian meseta or central Spanish plateau. The northern section of Morocco is constituted by a coastal chain, known as the Rif, which lies between the straits of Gibraltar and Algeria. This chain was shown to be a continuation of the Betic Cordillera, which includes the Sierra Nevada.

A sketch of the two straits which preceded the Strait of Gibraltar was given next. The oldest is the north Betic Strait, which occupied the site of the Guadalquivir valley north of the Betic Cordillera. The closing of this passage was followed by the opening of a new strait connecting Algeria with the Atlantic Ocean *via* Taza and Fez. This is the one which Gentil has called the South Rifan strait and which gave way to that of Gibraltar. Attention was called in conclusion to Morocco's natural resources, especially with regard to the economic importance of its soils.

A popular lecture on the Egyptian desert was given by Dr. W. F. Hume. Fine forms of erosion due to eolian agencies and typical of desert conditions were shown on the screen.

[1] This map was revised in 1911 and is now distributed by the U. S. Geological Survey with Professional Paper No. 71 (see review in *Bull.*, Vol. 44, 1912, pp. 40-44).

The organization of the Congress both as regards excursions and the work of the sessions was most creditable to the Canadian geologists. Planning for the 25,000 miles of excursion routes was no light task. The organized trips were carried out to everyone's satisfaction. Too much stress cannot be laid on the high usefulness of these excursions. An admirably compiled set of guide-books served to enhance the benefits derived from the trips. These publications contain much unpublished material on the geology and geography of the regions visited and form a valuable contribution to the year's scientific output.

Mr. Wheeler's Guide Book of the Selkirk Mountains. Mr. A. O. Wheeler, Director of the Alpine Club of Canada and joint author with Elizabeth Parker of "The Selkirk Mountains. A Guide for Mountain Pilgrims and Climbers," wrote to the Society some time ago that in his opinion the review of his book by Mr. H. Palmer published in the *Bulletin*, Vol. 44, 1912, p. 694, tended "unjustly to discredit the work." The reviewer's statements and Mr. Wheeler's comments are somewhat condensed here.

The reviewer: The two principal chapters are given to the Summit Range near Glacier, the Purcell Range and the country about the headwaters of the Columbia River. The latter being new is of especial value. Mr. Wheeler: These areas have been known, visited and written about for some years by Gleason, Dr. and Mrs. Adami, Messrs. Harnden and Emerson and many others.

(P. 85 of the guide-book.) The reviewer: Purity Pass is not connected with Purity Glacier nor is its altitude 9,200 feet, but 8,700 feet. Mr. Wheeler: The pass described in the guide-book is immediately east of the snowcone and the north aretê of Mt. Purity, and the glacier referred to lies directly below it to the north. It *is* 9,200 ft. at the summit of the pass and *is* connected with the glacier referred to as Purity Glacier (see topographical map in Wheeler's "Selkirk Range" published by the Dept. of the Interior of Canada, 1905). The Geographic Board of Canada informs me that the name Purity Glacier has been applied to that shown as Battle Glacier on the map referred to—that is to the one directly south of the pass described and connecting with it.

(P. 98.) The reviewer: Terminal Peak agrees in neither position nor altitude with the same as mapped. Mr. Wheeler: Terminal Peak *is* as shown on the map. It is directly south of the head of Sir Donald Glacier and its correct altitude is 9,773 feet as stated.

(P. 96.) Reviewer: Mt. Sugarloaf cannot be climbed as described under Route 2. Mr. Wheeler: On looking up the original manuscript I find an omission in transcription. The original reads: "Route 2: Take the Asulkan trail and Pass, the Dawson Moraine, Donkin Glacier and Pass, camping the first night in Mitre Creek Valley; the second day cross the west end of Bishop's Range *and Purity Pass, descend Battle Glacier to a camp below the forefoot;* the third day ascend the mountains from the west." The words in italics were omitted.

(Pp. 30 and 94.) The reviewer: Mt. Sir Sandford was first attempted in 1907 not in 1908 and not by the party named. Mr. Wheeler: Mr. Palmer does not state by whom the first attempt was made. I have been unable to find any published record of an organized attempt on Mt. Sir Sandford in 1907 nor have I heard of any such. The attempt, if such were made, appears to have been unimportant as the peak was not reached by several miles.

(P. 10.) The reviewer: The Columbia River flows northerly from Columbia Lake for about 175 miles, not 300 miles. Mr. Wheeler: The text reads: "Rising in Columbia Lake over 100 miles south of the railway, the river flows north *some* 300 miles." Captain F. P. Armstrong who has navigated the Columbia between its source and Golden for many years, sends me the distance from the source in Canal Flats to Golden as 132 miles. The length of the railway which follows the river more or less directly from Golden to Beavermouth according to the C.P.R. measurement is 28 miles. Mr. Turner Bone C. E. of Calgary who has made investigations for the Canadian Pacific Railway from Beavermouth to the Big Bend, sends me an estimate of the distance from Beavermouth to the Big Bend as 85 miles. The full distance

therefore from the source of the Columbia to Big Bend, according to the latest technical evidence, is 245 miles. I think 10 per cent. may be added for sinuosities, making a total of 270 miles—an estimate considerably nearer 300 than 175 miles.

(P. 150.) The reviewer: The author will find few supporters for the statement that heat and cold, contraction and expansion cause large crevasses in glaciers. Mr. Wheeler: The text in the guide-book reads as follows: "Heat and cold, contraction and expansion *and the unevenness of the bed over which it moves downward,* cause large cracks to occur across the ice river." I believe that heat and cold have a great deal to do with the uncovering and covering of crevasses and also with their enlargement and diminution.

(Pp. 174, 176.) The reviewer: Porcupines, squirrels and eagles are common, pp. 174 and 176, to the contrary notwithstanding. Mr. Wheeler: I have referred this criticism to Prof. John Macoun, Dominion Naturalist, who is responsible for the statement in the Guide-book. He remarks that "the gentleman's information is inadequate. The red squirrel and the porcupine are comparatively rare in the Selkirks. The golden eagle is rare throughout the mountains and the bald-headed eagle, while common along great waterways such as the Columbia and Kootenay Rivers and lakes, is rare amid the Selkirk peaks where the streams are chiefly glacial torrents and fish are few."

Mr. Wheeler briefly refers to a few minor inaccuracies which Mr. Palmer noted and says in conclusion: "I am obliged to Mr. Palmer for calling my attention to errors where they exist. The book is a first issue of a guide-book covering a very large area of mountain country and the information is as correct as can be had with present knowledge. It needs no apology. Descriptions are given for more than 250 place names. Thirteen statements are challenged by Mr. Palmer, six of them incorrectly, the remaining discrepancies are trivial and evidently slips that had escaped notice in the proof-reading. They will be corrected in the next issue."

PERSONAL

Dr. L. A. Bauer, Director of the Department of Terrestrial Magnetism, Carnegie Institution, Washington, has received the Georg Neumayer gold medal. This is the first award of the medal since 1906. Dr. Bauer has also received the honorary degree of Doctor of Science from the University of Cincinnati.

Professor Isaiah Bowman of Yale University, who has recently returned from his latest explorations in South America, was elected a Corresponding Member of the Geographical Society of La Paz, Bolivia, on August 12, "in recognition of his special knowledge and geographical studies."

Mr. Frederick G. Clapp of Pittsburg, Pennsylvania, spent the summer in an automobile trip through parts of Transylvania and Hungary, where he studied the geology of the natural gas fields and of the salt deposits and the associated geographical features.

Instructor C. L. Dake of Williams College has been appointed Professor of Geology and Mineralogy in the Missouri School of Mines.

Prof. W. M. Davis has been elected Honorary Member of the Netherlands Geographical Society of Amsterdam.

Prof. Dr. Albert Heim of Zürich has been elected a Foreign Member of the Academy of Sciences, Washington.

Dr. Johan Hjort, the Norwegian oceanographer, has received the Agassiz medal of the Academy of Sciences, Washington.

Dr. Charles T. Kirk, recently of the U. S. Geological Survey, has been appointed Professor of Geology in the University of New Mexico.

Dr. Th. Koch-Grünberg, the explorer of the source streams of the Rio Negro, Brazil, has been appointed Associate Professor of Ethnology at the University of Freiburg.

Dr. Henry Fairfield Osborn, President of the American Museum of Natural History, visited in August the expeditions conducting paleontological explorations for the Museum in the West.

Prof. Dr. Eduard Suess, of the University of Vienna, has received the Gandry medal of the Geological Society of France.

XUM

OBITUARY

HERMANN CREDNER. Dr. Hermann Credner, Professor of Geology at Leipzig and Director of the Saxony Geological Survey, died in August at the age of 72 years.

JOHN MILNE. Professor John Milne, F.R.S., mining engineer and seismologist, died at his home in the Isle of Wight on July 31 at the age of 63. He was the author of standard works and papers on seismology, geology and mineralogy. For twenty years he was in the service of the Japanese government as geologist and mining engineer. He established the seismic survey of Japan, embracing 968 stations and later a seismic survey of the world for the British Association. Among his writings are "Earthquakes," 1883; "Seismology," 1898.

FREDERICK G. PLUMMER. Mr. Frederick G. Plummer, Geographer of the United States Forest Service, died on August 18, aged 69 years.

ARMINIUS VAMBÉRY. Professor Arminius Vambéry died in Budapest on September 14 in his eighty-second year. He was born of Jewish parents in the Hungarian town of Duna-Szerdahely. At sixteen years of age he was conversant with many of the principal languages of Europe and Asia. When he was twenty years old his great ambition was to visit parts of the Orient and follow up his linguistic studies there. Baron Joseph Eötvös helped him to go to Constantinople, where he eked out a living by teaching languages. During his six years there he published his Turkish-German dictionary and acquired some twenty Oriental languages and dialects. In spite of his scanty means he resolved to go to Khiva, Bokhara and Samarkand to pursue his linguistic researches. The Hungarian Academy of Sciences in 1861 voted him 1,000 florins to investigate the affinities of the Magyar tongue in the interior of Asia. In the disguise of a dervish he traveled to Persia and left Teheran in March, 1863, for Khiva, which he reached at the end of May after intense suffering from thirst in the desert. His disguise was never penetrated, he was treated with exceptional kindness by the Khan of Khiva, and after visiting Samarkand, Herat and Meshed he made his way back to Hungary. He had escaped the fate of Conolly, Stoddart, Moorcroft and others who had ventured into these inhospitable regions and were put to death.

Vambéry's book "Travels in Central Asia" was one of the most remarkable successes in geographical literature. In a few years it was translated into fourteen or more European and Oriental languages. He had much difficulty in writing it as his main reliance was his memory, for he had been able to take very few notes and these he had written on scraps of paper concealed in his clothing. He was appointed professor of Oriental languages in the University of Budapest, where he found the opportunity he desired for study and writing. He kept himself in constant touch with the East and was one of the leading authorities on the countries he had visited. He wrote some twenty books and among the latest of them were "Arminius Vambéry, his Life and Adventures" (London, 1883) and "Story of My Struggles," 2 vols., London, 1904.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

CENTRAL AMERICA AND WEST INDIES

Zone Policeman 88. A Close Range Study of the Panama Canal and its Workers. By Harry A. Franck. 314 pp. Ills. The Century Co., New York, 1913. $2. 8½ x 6.

As a rule, three-fourths of the chapters in travelers' narratives are a bore. "Zone Policeman 88" is one of the exceptions. Mr. Franck is a rare traveler. He sees about everything within his horizon, and what is more, he sees into it. He finds keen interest in everything that touches human life, and sees the humor if there be any. Whether as census taker, trying to ascertain the family record of a motherly old negress who doesn't recall when she was born or where, or, as a policeman, interpreting to an American police justice the testimony of a Turk, who is trying to testify in Spanish, Mr. Franck sees always the sunny and the human side of life. His descriptions of men, scenes and events are penned in a style and with a diction that pass them before you like scenes and characters in a play. He keeps himself always in the background. You scarcely notice that the first person singular is used.

Notwithstanding his seeming desire to avoid seriousness, his observations upon the great work in the Canal Zone are convincing. He declares the zone the best governed place under the stars and stripes, calls the job an object-lesson in socialism, assures us that canal disasters are never belittled, holds that the "Colonel" is the man of blood and iron that makes the whole great machine run effectively, says the Spaniards are the best and most cheerful white laborers in the zone, and declares that if there is one place on the earth's surface where "Graft eats slim meals" it is in the Canal Zone.

When Mr. Franck and his associates finished their census taking in February, 1912, they reported 62,810 souls (more or less) in the Canal Zone; 25,000 of them British subjects—West Indian negroes; 37,428 were employed by Uncle Sam; 5,228 were white Americans, none of whom was doing common labor. R. H. WHITBECK.

ASIA

Archäologische Beobachtungen von meinen Reisen in den nördlichen Grenzgegenden Chinas in den Jahren 1906 und 1907. Von J. G. Granö. 54 pp. Map, ills. *Journal de la Soc. Finno-Ougrienne*, Vol. 26, Helsinki, 1909.

Mr. Granö's paper has a number of interesting illustrations of an archæological and ethnographical character and a map showing the routes of Mr. Granö in Northwestern Mongolia in 1906 and 1907. The illustrations represent stone implements and rudely carved or inscribed stones from a part of Asia still little known. The geography of the regions traversed is well considered and the short cut clear descriptions of country are placed in notable connection with its antiquities. In a land where land tillage depends entirely upon irrigation, as along the frontiers of western Mongolia, while the indigenous population is nomadic, sculptured stones and burial places are of special interest. Most of the inscriptions (probably of later date) are in old Turkish. Interesting is the mention of sacrificial places on mountain passes, recalling the Peruvian "Apachetas." AD. F. BANDELIER.

AUSTRALASIA AND OCEANIA

Untersuchungen über eine melanesische Wanderstrasse. Von Georg Friederici. Wissenschaftliche Ergebnisse einer amtlichen Forschungsreise nach dem Bismarck-Archipel im Jahre 1908, III. 182 pp. Map. *Mitt. aus den Deutschen Schutzgeb. Ergänzungsheft No. 7.* E. S. Mittler & Sohn, Berlin, 1913. Mk. 3.60. 13 x 10.

Captain Friederici has admirably performed a work of great value in clarifying the tangle of the ethnology of the boundary region of Indonesian and Melanesian, particularly in eastern New Guinea, the Bismarck Archipelago and the subjacent Solomon Islands. These fertile researches mark a second step in progress of the new method of dealing with the problems of this region.

Through all the earlier period of study of the population of the south and western Pacific, investigators have been content to note that a migration must have poured out from the Malay Sea upon the islands of Melanesia and Polynesia. Under the dominance of Bopp's classification of the Malayo-Polynesian speech family they have been satisfied with the mere statement of such an inferential migration. This Malayo-Polynesian family has been the target of my attack in several volumes. In my treatise on the Subanu of Mindanao, shortly to appear, I am confident that I have demolished it; Captain Friederici, not having this final disproof in hand, clings somewhat to the earlier system. I may properly assume credit for having developed the method of examining this inferential migration in my "Polynesian Wanderings" (1911). I took the ground that if such a migration had taken place it must have left its memorials in the space intervening between Indonesia and Polynesia. From study of the linguistic material I laid out two tracks of this folk-movement, one issuing south of New Guinea through Torres Strait, the other north of that island by way of St. George's Channel between New Britain and New Ireland, allotting from their respective termini the designations Viti and Samoa Stream.

Following the method which I established, Friederici in this volume has added valuable details. For reasons very courteously stated he holds my Viti Stream not satisfactorily established. The particular studies of this work are directed upon my Samoa Stream. He minimizes the importance of the portal of exit through St. George's Channel and divides the northern stream as finding principal exists through the Dampier-Vitiaz straits between New Britain and New Ireland and wholly around the Bismarck Archipelago along the east coast of New Ireland. These two streams he derives respectively from the Alfuro of Ceram and neighbor islands finding exit through the Dampier-Vitiaz straits, and from the southern Philippines finding exit to windward of New Ireland. His proof, so far as it has to do with Melanesian settlement, is very ingenious and convincing, all the more because he richly supplements it by ethnological detail upon which I had not ventured. His conclusions by no means blot out my Samoa Stream, they supplement it with valuable detail; even if my earlier determination should be found untenable it will stand as pioneering in a new method and all students will welcome this additional definition in a work which has within less than three years begun to assume certitude.

Friederici establishes the name Alfuro as of Malayan provenience and thus abolishes the unsatisfactory derivation from Moorish and Portuguese. He regards the Alfuro, and my Subanu studies lead me to the same result, as antecedent to the modern Malayan population of the islands in which they occur in a lower stratum of society or geographically an inner position. I am not prepared to accept the conclusion that Alfuros as such populated the Melanesian islands. I regard them in Ceram and elsewhere as survivals of the mixture of the first Malay invasion with the Polynesians then in possession of Malaysia; and that the later invasion of the Malays in overwhelming force dislodged the Polynesians toward ever eastward flight and left the earlier and more primitive Malayans in possession of a small speech community which I cannot discover to amount to more than 250 vocables.

This is a masterly contribution to the new study of folk-movement in the Pacific. I welcome it both as corrective and supplementary to my pioneer

work in that field and I am sure that Captain Friederici will join with me in awaiting with interest future developments along this new line of research.

WILLIAM CHURCHILL.

EUROPE

Durch Albanien und Montenegro. Betrachtungen zur Völkerkunde, Politik und Wirtschaftswelt der westlichen Balkan-halbinsel. Von Hugo Grothe. 2. Auflage. 224 pp. Maps, ills. M. Mörikes, München, 1913. Mk. 4. 9 x 6½.

The initial purpose of this volume almost precludes its consideration in a geographical journal, for it is the record of war in the Balkans and the diplomacy of territorial accession and aggrandizement through victory. But Dr. Grothe is a master of geographical science and his contribution to our better information upon the lately belligerent states and the geographical and ethnical base which he indicates as the only safe foundation for the new states are entitled to attention.

He points out the natural boundaries, the actual frontier of rock masses, which have parted Serb and Wallach and Albanian in this complex of mountains. It is the opposite of Switzerland, and it has produced the opposite effect. The Alps have drained their once sundered population into a pool where jangling elements have mingled and unity has created a nation and a national spirit. The Balkan Peninsula has had a centrifugal effect, its mountains have parted races and kept them apart in small communities with little admixture. He shows that plenipotentiaries of the peace with their protocols may disregard these natural frontiers, but, in the long run, he believes the only peaceful partition of the land will be that which follows the boundaries set by nature.

United Italy. By F. M. Underwood. xiv and 360 pp. Ills., index. George H. Doran Co., New York, 1912. $3.50. 9 x 5½.

Italians and their influence at home and abroad is the author's main theme. Mr. Underwood's account of modern Italian life is ably treated. He deals with hard-working and hard-thinking Italians. The radical changes since 1870, when Italian regulars took possession of Rome, reveal the leanings of Italian thought towards modern tendencies. This wholesome growth is apparent throughout the description of the country's development, which the author connects with the stimulating influence of many of Italy's eminent sons.

LEON DOMINIAN.

Deutsches Wirtschaftsleben auf geographischer Grundlage geschildert von Dr. Christian Gruber. Neubearbeitet von Dr. Hans Reinlein. 3. Auflage. In series: Aus Natur und Geisteswelt, 42. Bändchen. 133 pp. B. G. Teubner, Leipzig, 1912. Mk. 1.25. 7½ x 5.

This little book, with its concrete illustrations, presents a compact discussion of Germany's "Wirtschaftsleben" based upon geographical principles. It is rather difficult to translate the title and at the same time retain its idiomatic meaning. The subject is divided into three parts, each of which is further subdivided. The headings are: (1) The Geographical Basis for Germany's Wirtschaftsleben (German Affairs); (2) The Extent of Germany's Geographical Contracts; (3) Germany's rights upon the Seas, or perhaps more freely translated, German Supremacy on the Seas.

Each topic is logically discussed and the enthusiasm of the author is felt throughout. Although every part of the presentation is interesting, the practical turn given at various points, as on pages 45 to 49, is worth noting. Here the author shows the influence of foreign travel in Germany during the tourist season to be a factor of rather vital import in the maintenance and development of many cities. The geographical reason for the presence of the tourist is the beauty of the scenery.

Statistics occur frequently to substantiate statements but are always interwoven skilfully; hence they are not a burden. The general style is appealing.

EUGENE VAN CLEEF.

XUM

La Suisse Préhistorique. Le Paléolithique et le Néolithique. Par Dr. A. Schenk. Préface du Dr. F. A. Forel. x and 632 pp. Map, ills., index. F. Rouge & Cie, Lausanne, 1912. 10 x 6½.

The author, former Curator of the Archæological Museum of Lausanne, died in 1910 at the age of 36 years. Originally a teacher, he turned his attention to Archæology and Anthropology and specially cultivated human Paleontology.

A careful perusal of his book convinces the reader that the author had completely mastered his subject up to the date of his death. Not only was he fully conversant with what concerns his native country and adjacent regions of Europe, but he was thoroughly familiar with the literature of all previous times, as far as it emanated from European sources. The same cannot be said in regard to American literature.

Of the earliest paleolithic period, preceding the last glaciation, rude implements alone, prove, as yet, the co-existence of Man, the Mastodon, and other pachyderms now extinct. The earliest traces of man in Switzerland do not go further back than the Pleistocene or lower Quaternary. His remains are limited to caves and these seldom contain human vestiges. The cave-dweller was succeeded, in time, by man of the neolithic period, among which the lake-dwellers have attracted chief attention. While the lake dwellings of the Neolithic period, owing to their number in Switzerland and the comparative ease with which their features and artefacts could be studied, attracted chief attention for a time, it was soon discovered that, about the same time, man lived also on land and that he raised monuments of stone also. The Dolmens, Menhirs, Cromlechs belong, according to our author, to the same period. Only, he says, there are fewer vestiges left, because their destruction and that of artefacts was more complete. The water of the lakes covered and preserved wooden remains of dwellings and implements, débris of artefacts could accumulate around the piles and at the lake-bottom. The remains of villages and of rude fortifications on land exist in many places on Swiss soil, and what they reveal of vestiges of human industry is clearly neolithic. The book mentions the appearance of copper and bronze at the end of Neolithic times. Further than those times the work does not extend.

The author pays no attention to work in his field in or about America. Now and then the new continent (so-called) is alluded to, but briefly. And yet, America would be well worthy of attention, since almost every other part of the world is drawn upon for illustration and comparison. Some attention might have been paid to the questions raised by Dr. Hrdlička regarding the antiquity of man. Where Dr. Schenk discusses every imaginable theory based upon Darwinism, it might not have been amiss, since he digs deeply into the obscure field of the origin and formation of so-called races of men based upon cranial peculiarities, to refer to artificial deformation of crania, so positively established among American tribes and continued among them during post-columbian times, and the possible atavistic influences thereby exerted. He presents a handsome type of prehistoric trephyning, and speculates on the why and wherefore of the operation, ignoring the frequency of it among numerous Indian tribes.

AD. F. BANDELIER.

POLAR

Le Monde Polaire. Par Otto Nordenskjöld. Traduit du Suédois par Georges Parmentier et Maurice Zimmermann. Préface du Dr. Jean Charcot. xi and 324 pp. Maps, ills. Armand Colin, Paris, 1913. Fr. 5. 7½ x 4½.

A fine translation of one of the best Polar books of recent years. The German edition "Die Polarwelt und ihre Nachbarländer" published in 1909 was reviewed in the *Bulletin* (Vol. 41, 1909, pp. 775-776). Dr. Nordenskjöld as Polar explorer, geographer and geologist was exceptionally competent to write for all intelligent readers this book telling many things best worth knowing about the lands around the poles, their characteristics, life and utility.

Arctic

Lost in the Arctic. Being the Story of the "Alabama" Expedition, 1909-1912. By Ejnar Mikkelsen. xviii and 400 pp. Map, ills., index. George H. Doran Co., New York, 1913. $5. 10 x 7.

Mikkelsen's expedition to Northeast Greenland was undertaken in the hope of recovering the diaries and detailed maps which were lost when Captain Mylius Ericksen and Lieut. Hagen perished after their heroic and successful efforts to complete the surveys of the Greenland coast. To the heroism of the Eskimo Bronlund, the third member of the party, the world owes a debt of gratitude; for he carried the sketch maps of Lieut. Hagen and his own diary (in the Eskimo language) to a point where his body was certain to be ultimately found. The last entry in his diary (this in Danish) merits a place beside that of Captain Scott. He wrote, "I arrived here in waning moonlight and could not go further for frozen feet and darkness."

Mikkelsen's expedition was in no sense a scientific one in itself, and it consisted of but seven men in a 40-ton sloop. His great sledging expedition with the engineer Iversen across the inland ice of the Northeast Foreland of Greenland to Danmarksfjord and back around the coast to Shannon Island, made, as it was, with an insufficient outfit and in spite of almost continuous fierce blizzards, is certainly one of the most dare-devil achievements in the whole history of polar exploration, and his narrative is not surpassed in thrilling interest by any with which we are familiar. The last 100 miles was made by the two starving men after their supplies had been entirely exhausted and the last dog eaten.

They returned to find that the ship had foundered and that the remainder of the party had returned to Denmark, so that the two explorers were compelled to pass the winter alone in the hut and even another winter before they were finally rescued by a sealing vessel.

Although the maps and diaries of Ericksen and Hagen were not recovered, two messages of the lost leader were found in his cairns. One of these contained the important information that Peary Channel, between Peary Land and the mainland of Northeast Greenland, instead of being a channel, as Peary had supposed, is closed, and its name was therefore changed to Independence Fjord. An excellent map and many fine photographs accompany the volume.

WM. HERBERT HOBBS.

THE WORLD AND PARTS OF IT

Mittelmeerbilder. Gesammelte Abhandlungen zur Kunde der Mittelmeerländer. Von Dr. Theobald Fischer. 2. Auflage besorgt von Dr. Alfred Rühl. v and 472 pp. Index. B. G. Teubner, Leipzig, 1913. Mk. 7. 8 x 5½.

The late Prof. Theobald Fischer of the University of Marburg was all his life a specialist in the geography of the Mediterranean. The present volume appeared in its first edition in 1905, a revision under his own editorial direction of papers which in the course of a third of a century he had contributed to various journals and transactions of learned societies. He had in preparation a revision of the work, additions and corrections of earlier opinions, much of it in manuscript ready for print at the time of his death. In editing this second edition after Fischer's death Dr. Rühl was restricted by his publisher to the space limit of the first edition. It results that this is mostly a reprint, the principal new matter being a study of Mallorca and a discussion of Morocco in relation to Germany, and to make room for these it was necessary to omit certain chapters of earlier material. The volume is largely a work of descriptive geography, economic agriculture and political history occupying a large place in the author's scheme. In these two particulars the region is split into two great districts by the Mediterranean itself, the southern shore is the desert, the northern is under tilth, the southern is Semitic culture, the northern is Aryan. But there has always been from the beginning commerce between the two shores, commerce of peace and commerce of war, and in the events of the present he sees but the continuity of the exchanges of the past.

The New Pacific. By Hubert Howe Bancroft. Revised edition. x and 549 pp. Index. The Bancroft Co., New York, 1912. $2. 8 x 5½.

Bancroft's sense of world relations is keen and his vision optimistic. First appearing when the United States became a world power and there began a "new era of human emancipation," the volume has often been reprinted. Full of fact, as was to be expected from one whose life has been spent in amassing the information available in reference to Spanish history, the volume is well worth reading for its details alone. Although the order seems at first somewhat chaotic, yet the book has method and is rarely dull. Often the author writes with vigor and in a way to arrest attention and fix a point or a point of view. Except in a few respects, as, for instance, in reference to Sakhalin, the book has not been brought up to date.

RICHARD ELWOOD DODGE.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

LIVES OF THE PRESIDENTS OF THE UNITED STATES. Designed for Study and Supplementary Reading. By Edward S. Ellis. Revised by J. O. Hall. 240 pp. Ills. A. Flanagan Co., Chicago, 1913. 50 cents. 7½ x 5½. [Non-partisan sketches conveying a fair idea of the country's history.]

AMERICAN HEROES FROM HISTORY. By Inez N. McFee. x and 262 pp. Ills. A. Flanagan Co., Chicago, 1913. 7½ x 5½. [Short sketches for young readers.]

BESIEDLUNG UND ANBAU IM PAZIFISCHEN NORDWESTEN DER VEREINIGTEN STAATEN. Inaugural-Dissertation . . . Vereinigten Friedrichs-Univ. Halle-Wittenberg. Von Otto Reiche. 128 pp. Maps. Halle a. S., 1912. [Gives prominence to the geographical factors that have influenced agricultural development in Washington, Oregon and Idaho.]

ALL ABOUT COLORADO FOR HOME-SEEKERS, TOURISTS, INVESTORS, HEALTH-SEEKERS. By Thomas Tonge. 112 pp. Map, ills., index. T. Tonge, Denver, 1913. $1. 9 x 6½. [Many data of economic interest, but without systematic classification.]

THE MAKING OF ILLINOIS. Historical Sketches. By Irwin F. Mather. 278 pp. Maps, ills. A. Flanagan Co., Chicago, 1913. 50 cents. 7 x 5.

THE STORY OF BERKS COUNTY (PENNSYLVANIA). By A. E. Wagner, F. W. Balthaser and D. K. Hoch. 253 pp. Map, ills. *Reading Eagle Co.*, Reading, Pa. $1.25. 8 x 6. [Prominence given to the period of discovery. Concludes with concise paragraphs recapitulating the entire text.]

CANADA AND NEWFOUNDLAND. Seven Lectures Prepared for the Visual Instruction Committee of the Colonial Office. By A. J. Sargent. 117 pp. Maps, ills. G. Philip & Son, Ltd., London, 1913. 8d. 7½ x 5½. [Sketches of British North America, its economic importance and natural beauty.]

FOREST CONDITIONS OF NOVA SCOTIA. By B. E. Fernow. Assisted by C. D. Howe and J. H. White. xi and 93 pp. Maps, ills., index. Commission of Conservation, Dept. of Crown Lands, Ottawa, Canada, 1912. 10½ x 7. [Results of the first attempt in Nova Scotia to take stock of its timber resources. Illustrations and maps are excellent. A standard work.]

A MEXICAN JOURNEY. By E. H. Blichfeldt. viii and 280 pp. Map, ills., index. Thomas Y. Crowell Co., New York, 1912. $2.00. 8½ x 6. [Gives a good idea of the varied aspects of the land and its people.]

CENTRAL AMERICA AND WEST INDIES

A UNITED WEST INDIES. By the Hon. C. Gideon Murray. 127 pp. Map.

West Strand Publishing Co., London, 1912. 1s. 7½ x 5. [The administrative union of the Lesser Antilles and British Guiana is suggested on the basis of geographical positon and commercial interests.]

JAMAICA IN 1912. A Handbook of Information for Intending Settlers and Visitors, with some Account of the Colony's History. By Frank Cundall. vi and 154 pp. Maps, ills. Institute of Jamaica, Kingston, 1912. H. Sotheran & Co., London. 8½ x 5½.

AFRICA

FRÅN MIN AFRIKARESA. Anteckningar och Intryck af Th. Nordström. 148 pp. Ills. Wilhelm Billes, Stockholm, 1912. Kr. 2.50. 8 x 5½. [Travel notes showing care in the selection of important and accurate information.]

NEL MAROCCO. Ricordi Personali di Vita Intima. Di Lena (Maddalena Cisotti-Ferrara). xii and 292 pp. Ills. Fratelli Treves, Milan, 1912. L. 4. 7½ x 5. [Shows intimate knowledge of the plain life in Moroccan homes which the author was permitted frequently to visit. Such a book well supplements the data in more important works based on scientific observation alone.]

L'ITALIA E L'ISLAM IN LIBIA. Di A. Malvezzi. Società Italiana per lo studio della Libia. xxiv and 258 pp. Index. Fratelli Treves, Milan, 1913. 7½ x 5. [The shaping of a colonial policy best adapted to ensure economic prosperity is the author's theme.]

CIRENAICA. Conferenza di Roberto Almagià. iv and 56 pp. Map. Fratelli Treves, Milan, 1912. L. 1. 7½ x 5. [A résumé of our present knowledge of the region is succinctly given.]

THE XITH DYNASTY TEMPLE AT DEIR EL-BAHARI, Part 3. By Edouard Naville and H. R. Hall. With an appendix by C. T. Currelly. 36 pp. Ills., index. 32d Memoir of the Egypt Exploration Fund. London, 1913. 35s. 12½ x 10. [Deals with votive statues and steles dedicated in the temple to Amon or Hathor. Completes the series of publications of the Fund on the two temples of Deir el-Bahari.]

MADRÉPORAIRES DES ILES SAN THOMÉ ET DU PRINCE (GOLFE DE GUINÉE). Par Ch. Gravier. 28 pp. Ills. *Ann. de l'Inst. Océanogr.*, Vol. 1, Fasc. 2. Monaco, 1909. 13 x 10. [A contribution to the distribution of coral reefs in the Atlantic as well as to zoogeography in general. Emphasis placed on the favorable conditions for their growth at St. Thomas.]

BEITRÄGE ZUR GESCHICHTE DER NIEDERSÄCHSISCHEN FAMILIE ROSCHER. 1. Lebenslauf des Dr. Albrecht Roscher, von Heinrich Roscher. 2. Albrecht Roscher: Die Erforschung des Nigerstromes. 132 pp. Maps. L. Friederichsen & Co., Hamburg, 1912. 9 x 6½.

ASIA

FRA MANCHURIET. Rejseindtryk af J. Nyholm. 185 pp. Maps, ills. Danske Missionsselskabs Forlag, Kobenhavn, 1913. Kr. 1.25. 8 x 5½.

THROUGH PERSIA. By F. B. Bradley-Birt. 316 pp. Ills., index. W. Collin's, London & Glasgow. 1s. 6 x 4. [A journey from India westward. Persia depicted in many aspects.]

ANCIENT BABYLONIA. By C. H. W. Jones. xvi and 148 pp. Map, ills., index. Cambridge Manuals of Science & Literature. University Press, Cambridge. G. P. Putnam's Sons, New York, 1913. 1s. 6½ x 5. [A popular version of historical fact. The country and our methods of obtaining knowledge of its past are described.]

AUF DEN SPURÉN DER BAGDADBAHN. Von Ewald Banse. 155 pp. Maps, ills. A. Duncker, Weimar, 1913. Mk. 4. 9½ x 6. [From the alert pen of a traveler. Includes information on the Kurds, their civilization and the regions they inhabit.]

THE GEOLOGY AND MINING INDUSTRY OF THE KINTA DISTRICT, PERAK, FEDERATED MALAY STATES. By J. B. Scrivenor. viii and 90 pp. Maps, ills.

Government Printing Office, Kuala Lampur, 1913. $3. 9½ x 6. [The physical features of the Kinta valley and the relation of faulting to its land forms is of geographical interest.]

JAVA. Zoölogisch en Biologisch. Door J. C. Koningsberger. Aflevering I-VI. pp. 1-306. G. Kolff & Co., Batavia, 1911-12-13. F. 1 each. 10 x 7 each.

WISSENSCHAFTLICHE ERGEBNISSE DER REISE VON PROF. DR. MERZBACHER IM ZENTRALEN UND ÖSTLICHEN THIAN-SCHAN 1907-8. I: Vögel. Von A. Laubmann. 105 pp. II: Fische. Von Erich Zugmayer. 18 pp. Ill. III: Mollusken. Von Alois Weber. 26 pp. Ills. *Abhandl. Kgl. Bayer. Akad. der Wiss.*, Math.-physikal. Klasse, Vol. 26, 3., 4., 5., *Abhandl.* München, 1913. 11½ x 9 each. [Classification of zoological specimens.]

EUROPE

THE PREMIER ROAD BOOK OF GREAT BRITAIN. By A. Gross and F. Waite-Browne. 191 pp. Plans, index. Geographia, Ltd., London. 1913 (?) 1s. 6½ x 4½.

WARFARE IN ENGLAND. By Hilaire Belloc. Home Univ. Library. 254 pp. Maps. Williams & Norgate, London. 1s. 7 x 4½. [The influence of topography on strategy is comprehensively handled. Examples drawn from battles fought from the time of the Roman Conquest to the Scotch wars.]

THE GREAT WESTERN RAILWAY. By Gordon Home. Series: Peeps at Great Railways. iv and 92 pp. Ills. A. & C. Black, London, 1913. The Macmillan Co., New York. 55 cents. 8 x 5½. [The simplicity of style should make the book interesting to young readers.]

STATISTIK DER MÄRKISCHEN STEHENDEN GEWÄSSER. Vier Märkische Seen und die Beziehung zwischen Wassertemperatur und Tiergeographie in ihnen. Von. Dr. Max Samter. 82 and 4 pp. Maps. *Jahrb. für die Gewässerkunde Norddeutschlands*, Besondere Mitteil., Vol. 2, Nos. 4 & 5. E. S. Mittler & Sohn, Berlin, 1912. 13½ x 10. [Based on 387 sheets of the 1:25,000 topographic map of Germany.]

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

NORTH AMERICA

CANADA

British Columbia. British Columbia. [Compiled by] G. G. Aitken, Chief Geographer. 1912. 1:1,125,000. 61° - 48° N.; 140° - 112½° N. 7 colors. With two insets: (1) Dominion of Canada, [1:12,500,000]. 7 colors. (2) Sketch map of the World. [Mercator's projection; equatorial scale, 1:32,000,000]. In 4 sheets. Department of Lands, Victoria, B. C.

[In view of its relatively large scale this map is now the best general map extant of British Columbia, the nearest comparable delineation of the province being on the standard base map of Canada on the scale of 1:2,217,600 published by the Dominion Department of the Interior. Geographically it is a great improvement on the former products of the provincial department issuing it (formerly the Department of Lands and Works), being a careful compilation of the best material available. Although not showing relief it represents very completely the locational element. In addition to drainage and towns, railroads (distinction being made by color within the province between the Canadian Pacific, the Canadian Northern, the Grand Trunk Pacific, the Great Northern and the Pacific Great Eastern systems), roads, trails and telegraph lines are shown, besides the various categories of boundaries, including those of the land districts. Peaks and passes are shown with their altitudes. The use of so pale a color as pink to show roads is unfortunate, especially as the boundary tint used is so similar that lack of distinctness results where the two overlap.]

SOUTH AMERICA

Bolivia Brazil. Map of the Region between Tacna and the confluence of the Rivers Abuna and Rapirran. Prepared by the Bolivian Survey Commission under the direction of Commander H. A. Edwards, R.D., R.N.R., Ret'd. 1911-12. 1:500,000. 10°15′ - 11°18′ S.; 69°45′ - 67°10′ W. 1 color. With inset, west-central South America, 1:25,000,000, showing location of main map. Accompanies "Frontier Work on the Bolivia-Brazil Boundary, 1911-12" by H. A. Edwards, *Geogr. Journ.*, Vol. 42, 1913, No. 2, pp. 113-128.

[Valuable map showing mainly the region south of the Acre River in Bolivian territory. Positions astronomically determined are shown, distinction being made between those whose longitudes were determined by chronometer or by star occultations; also three kinds of route traverses, according to their accuracy. A list of the astronomic positions is printed on the border of the map.]

AFRICA

Central and South Africa. Equatorial and South Africa. 1:25,000,000. 3° N. - 35° S.; 5° - 47° E. 1 color. [Two maps:] (1) Before Livingstone's Journeys, from the London Atlas of Modern Geography published by John Arrowsmith, 1840. (2) By discovery or report after Livingstone's last researches were published, 1874. Accompany "Livingstone as an Explorer" by H. H. Johnston, *Geogr. Journ.*, Vol. 45, 1913, No. 6, pp. 423-446.

[Suggestive maps showing the state of knowledge about Africa south of the equator in 1840 and 1874. Their comparison brings out forcibly the remarkable extent of Livingstone's journeys, which brought to light the whole southern part of the great interior lake system of east-central Africa and the drainage system of the Zambezi. The problem as to the appurtenance of the headwaters of the Congo system, which Livingstone had discovered without realizing their true nature, still awaited, in 1874, its splendid solution by Stanley.]

Portuguese East Africa. Geographical Results of the Memba Minerals Expeditions of 1910 and 1911. From the compass traverses of the exploring staff under the leadership of E. W. E. Barton. Adjusted to positions astronomically fixed by R. L. Reid. 1:1,000,000. 13°25′ - 15°50′ S.; 36°45′ - 41°0′ E. 2 colors. With inset of Portuguese East Africa, etc., 1:12,000,000, showing location of main map. Accompanies "Notes on Mozambique Exploration" by R. L. Reid, *Geogr. Journ.*, Vol. 42, 1913, No. 1, pp. 44-49.

[Valuable map embodying route surveys of a strip of territory extending inland 250 miles from Mozambique Island and 100 miles north along the coast. Our knowledge of the greater part of this region is based solely on native reports, according to Cana's excellent map of Africa showing the progress of exploration (cf., under sub-head Africa, *Bull.*, Vol. 44, 1912, p. 78). Relief, where shown, in brown shading, drainage in blue, routes traversed in black.]

Portuguese East Africa. Mozambique: Sketch of the River Systems and Watersheds by Arthur Holmes. 1:1,750,000. 14° - 15⅜° S.; 36⅞° - 40° E. Accompanies, on p. 145, "Mozambique: A Geographical Study" by A. Holmes and A. Wray, *Geogr. Journ.*, Vol. 42, 1913, No. 2, pp. 143-152.

[Based on the map listed immediately above. Divides and drainage basins shown.]

Uganda. (a) Routenskizze der Rudolf Kmunke'schen Expedition in Uganda (Zentralafrika). Oktober 1911-April 1912. 1:750,000. 4° N. - 0°; 32° - 35° E. 1 color.

(b) Karte des Kraters vom Monte [*sic*] Elgon in Uganda. Photogrammetrisch aufgenommen von Architekt Rudolf Kmunke auf seiner Forschungsreise Oktober 1911-April 1912. Entworfen und gezeichnet von Ignatz Tschamler und Rudolf Langer. 1:40,000. 1°11.5′ - 1°3.5′ N.; 34°32′ - 34°40′ E.

Accompany, as Taf. 15 and 16, respectively, "Meine Forschungsreise durch Uganda" by R. Kmunke, *Pet. Mitt.*, Vol. 59, II, 1913, Aug., pp. 75-77.

[Map (a) a valuable route survey from Jinja at the outlet of the Nile from the Victoria Nyanza northeast to Mt. Elgon and thence northwest to the bend of the Nile at Dufile (3⅝° N.). As the route lies just without the areas mapped on the scale of 1:250,000 by the Uganda and East Africa Protectorate Surveys, the map is of value pending the completion of the official surveys. Relief, which was photographically surveyed, is shown along the route in contours. Map (b) a detailed contour map of the crater of Mt. Elgon. The highest point on the rim, named Kaiser Franz Josef Spitze by the author, has an elevation of 4382 meters.]

Uganda-Belgian Congo-German East Africa. Survey of the Anglo-German-Belgian Boundary Region by the British Commission under the command of Capt. E. M. Jack, R.E. 1911. 1:250,000. 0°50′ - 1°31′ S.; 29°30′ - 30°20′ E. 4 colors. With two insets: (1) [East-central Africa, 1:1,000,000, showing location of main map]; (2) Diagram of Triangulation on the Uganda Boundary (Anglo-German-Belgian) by the British Commission, 1911. Accompanies "The Mufumbiro Mountains" by E. M. Jack, *Geogr. Journ.*, Vol. 41, 1913, No. 6, pp. 532-550.

[Excellent map of the region lying to the northeast of Lake Kivu. Only the eastern members of the Mufumbiro Range (which is coincident with the Virunga volcanoes of the Duke of Mecklenburg's expedition) treated in the accompanying paper are shown on the map. Relief is in brown contours and shading, drainage in blue, forests in green. Consult also the map accompanying the Duke of Mecklenburg's book, listed in the *Bull.*, under "German and British East Africa-Belgian Congo," Vol. 43, 1911, p. 956.]

ASIA

China. Dr. Albert Tafel: Reise in China und Tibet, 1905-1908. Kartographische Ergebnisse, Teil I: China. 31 Karten im Massstabe 1:200,000. Herausgegeben von der Gesellschaft für Erdkunde zu Berlin. Mittler und

Sohn, Berlin, 1912. [Six pages of text (Introduction by A. Penck; "Erläuterung zur Konstruktion der Karten," by A. Tafel; and "Liste der benutzten geographischen Positionen") and 31 map sheets with one index map in portfolio, as follows:]

(a) Übersicht: I. Teil (China) [index showing arrangement of sheets.] 1:5,000,000. [42° - 32° N.; 102° - 113° E.] With inset: [Central and Western China and Tibet showing Dr. Tafel's routes.] [1:18,500,000.] 42° - 30° N.; 94° - 116° E.

(b) [31 sheets, 1:200,000, 2 to 3 colors, viz.:] Blatt 1: 32°50′ - 32°15′ N.; 110°50′ - 111°50′ E. Blatt 2: 33°40′ - 32°50′ N.; 110°45′ - 111°25′ E. Blatt 3: 34°15′ - 33°40′ N.; 110°5′ - 111°5′ E. Blatt 4: 35°5′ - 34°15′ N.; 110°5′ - 110°45′ E. Blatt 5: 35°55′ - 35°5′ N.; 110°11′ - 110°51′ E. Blatt 6: 36°45′ - 35°55′ N.; 110°15′ - 110°55′ E. Blatt 7: 37°35′ - 36°45′ N.; 110°20′ - 111°0′ E. Blatt 8: 38°10′ - 37°35′ N.; 110°30′ - 111°30′ E. Blatt 9: 39°0′ - 38°10′ N.; 110°40′ - 111°25′ E. Blatt 10: 39°35′ - 39°0′ N.; 110°30′ - 111°30′ E. Blatt 11: 39°0′ - 38°25′ N.; 111°25′ - 112°25′ E. Blatt 12: 39°35 - 39°0′ N.; 112°5′ - 113°5′ E. Blatt 13: 40°10′ - 39°35′ N.; 111°20′ - 112°20′ E. Blatt 14: 41°0′ - 40°10′ N.; 111°25′ - 112°10′ E. Blatt 15: 41°15′ - 40°38′ N.; 110°30′ - 111°35′ E. Blatt 16: 40°50′ - 40°0′ N.; 109°50′ - 110°30′ E. Blatt 17: 40°0′ - 39°10′ N.; 109°30′ - 110°10′ E. Blatt 18: 39°10′ - 38°20′ N.; 109°20′ - 110°0′ E. Blatt 19: 38°20′ - 37°30′ N.; 108°40′ - 109°40′ E. Blatt 20: 37°45′ - 37°5′ N.; 107°40′ - 108°40′ E. Blatt 21: 37°40′ - 37°0′ N.; 106°40′ - 107°40′ E. Blatt 22: 37°30′ - 36°50′ N.; 105°40′ - 106°40′ E. Blatt 23: 38°20′ - 37°30′ N.; 105°40′ - 106°30′ E. Blatt 24: 39°0′ - 38°20′ N.; 105°30′ - 106°30′ E. Blatt 25: 37°40′ - 36°50′ N.; 105°0′ - 105°40′ E. Blatt 26: 37°30′ - 36°40′ N.; 104°20′ - 105°0′ E. Blatt 27: 36°40′ - 36°0′ N.; 103°45′ - 104°45′ E. Blatt 28: 36°0′ - 35°15′ N.; 103°5′ - 104°5′ E. Blatt 29: 36°0′ - 35°20′ N.; 102°5′ - 103°5′ E. Blatt 30: 36°40′ - 36°0′ N.; 102°45′ - 103°45′ E. Blatt 31: 36°40′ - 36°0′ N.; 101°45′ - 102°45′ E.

[A remarkable series of maps embodying Dr. Tafel's route surveys in China in 1905-1908. The route led from Künchow on the Han River (32⅔° N. and 111¼° E.) north across the eastern end of the Tsin-ling-shan to the bend of the Hoangho at Tungkwan, thence up the meridional course of the Hoangho in 110½° E. to near the northern end of this south-flowing section, whence it encircled on its outer side the right-angled bend which the river here makes from an eastern to a southern course. From this bend the route lay southwest, outside of the Great Wall, through the Land of the Ordos Mongols to the northeast-flowing course of the Hoangho in 37½° N. From here the river was descended to Ninghiafu from which a side trip was made across the Alashan, here paralleling the Hoangho on the west. Retracing his steps up the Hoangho from Ninghiafu Dr. Tafel continued to ascend the river to Lanchowfu. From here he encircled to the south the easterly course of the Hoangho and, turning to the northwest, crossed it in 110⅓° E. and finally reached Siningfu on the Tibetan border, whence Lanchowfu was again reached by following down the valley of the Sining River. At this point connection is made with Dr. Tafel's route through Tibet, the surveys of which will be subsequently published in a second part. (For an account of Dr. Tafel's journey see *Zeitschr. Gesell. für Erdkunde zu Berlin*, 1908, pp. 377-395.)

The routes followed were mainly chosen at the suggestion of von Richthofen, whose pupil Dr. Tafel was, with a view to elucidating the relationships of the mountain ranges which emerge from the Tibetan Plateau into the Chinese lowland—a subject to which von Richthofen had contributed so much. The teacher's advice, too, as to the desirability of careful route surveys even in regions that had already been traveled over, was most faithfully followed by the pupil. In fact, the painstaking care with which Dr. Tafel's surveys were executed partakes of that quality which has been defined as the essence of genius. Every method to insure accuracy was employed: the result is a remarkable contribution to our knowledge of China, an object lesson, similar to Sven Hedin's, as to the possibilities of one man, single-handed, to enlarge our knowledge of the earth's surface.

The explorer's assiduity is reflected in the wealth of material of the maps.

Relief, that most important and, at the same time, most difficult geographical element to represent, is shown with unusual completeness. For the three- to five-mile strip along the route it is shown in full black contours of 50 meters interval, supplemented by shading in brown. Where relief was not directly surveyed in the field but subsequently deduced from notes or drawings or photographs, broken contours are used. For the more distant country shading alone is used, the territory thus represented extending generally to 10 or 15 miles on both sides of the route. Barometrically determined elevations abound along the route, while altitudes of nearby points and summits, as determined by compass sights, are frequent. Distinction is made between three kinds of forest; dunes are indicated by separate symbols and sand deserts are shown by means of a yellow tint; and there are symbols for swamps and meadows. Drainage is in blue, five kinds of symbols being used, including one to show irrigation ditches. Six sizes of towns are differentiated, and the number of families inhabiting each is given. Roads, telegraph lines, walls (separate symbol for the Great Wall), missions, monasteries, bridges, fords, are all represented, distinction generally being made between different kinds. Not the least value of the maps is due to the careful distinction between things surveyed and things seen which characterizes them throughout.]

AUSTRALASIA AND OCEANIA

Western Australia. [Two maps:] (1) Part of North West Australia to illustrate the paper by P. D. Montague. 1:1,250,000. 20° - 22° S.; 114¾° - 116¾° E. 1 color. With inset of Australia showing location of main map. (2) Monte Bello Islands. 1:125,000. 20°20′ - 20°33′ S.; 115°27′ - 115°38′ E. 1 color. Accompany "The Monte Bello Islands" by P. D. Montague, *Geogr. Journ.*, Vol. 42, 1913, No. 1, pp. 34-44.

[The Monte Bello Islands lie 40 miles northwest of the mouth of the Fortescue River off the coast of Western Australia. Map (2) based on Admiralty Chart No. 3186; areas dry at low water and mangrove swamp shown.]

EUROPE

England. The "Long Valley" and Environs, Aldershot. 1:10,560. [51¼° N. and ¾° W.] 1 color. Accompanies "An English Desert" by A. G. Ogilvie, *Geogr. Journ.*, Vol. 41, 1913, No. 6, pp. 569-575.

[Map of a locality in which desertic conditions have been brought about artificially by the removal of the vegetational cover through the action of artillery and cavalry which use it as a manœuvering ground.]

Servia–Montenegro (according to the new boundaries). Sketch map of the Sanjak of Novibazar. 1:1,500,000. 44° - 42°30′ N.; 18⅔° - 22° E. Accompanies "The Sanjak of Novibazar," *Geogr. Journ.*, Vol. 41, 1913, No. 5, pp. 468-473.

[Based on the map by Gravier in the *Annales de Géographie*, listed as map (a) under "Turkey, etc.," in the *Bull.*, Vol. 45, 1913, No. 6, p. 480.]

POLAR

Antarctic. British Antarctic Expedition. [Three sketch maps:] (1) (Track of the *Terra Nova* and Route of Southern Party.) [1:90,000,000.] Polar cap within 40° S. (2) (Routes of Griffiths Taylor [and] Wilson.) [1:3,000,000.] 76¼° - 78¾° S.; 160° - 171° E. (3) (Route of Southern Party.) 1:13,000,000. 70° - 90° S.; 150° E - 150° W. Accompany on pp. 13, 17 and 19, respectively, "The British Antarctic Expedition, 1910-13" by E. R. G. R. Evans, *Geogr. Journ.*, Vol. 42, 1913, No. 1, pp. 11-28.

Arctic. The Canadian Arctic Expedition. To illustrate the paper by V. Stefánsson. [Two maps:] (1) [Proposed routes of the expedition.] 1:25,000,000. 90° - 63° N.; 170° - 10° W. 1 color. (2) [Polar regions show-

ing supposed land mass according to tidal evidence.] 1:25,000,000. Polar cap within 60° N. Accompany "The Canadian Arctic Expedition" by V. Stefánsson, *Geogr. Journ.*, Vol. 42, 1913, No. 1, pp. 49-53.

[Map (2) is based on R. A. Harris's map of the cotidal lines for the Arctic Region in his "Arctic Tides" (publication of the U. S. Coast & Geodetic Survey, 1911), which is reproduced in the *American Museum Journal* for Feb. 1913. The somewhat sensational term "Supposed Arctic Continent," excusable in the account of the expedition appearing in the daily press, has unfortunately also found its way into this, a map appearing in a professional journal, to designate what at most is a land mass or archipelago of the size of Alaska (500,000 square miles in round numbers as against 3,000,000 square miles of the smallest continent, Australia).]

ATLASES

Atlas of the World. By J. G. Bartholomew, F.R.G.S. 56 plates. In series: The People's Books. T. C. & E. C. Jack, London, Dodge Publishing Co., New York [1913?]. 6d and 20 cents. 4½ x 6½ inches.

[Good miniature atlas of political maps whose quality is guaranteed by their being products of the Edinburgh Geographical Institute.]

Atlas de Geografía Universal (250 mapas). Dispuesto por Saturnino Calleja Fernández. 98 plates with index. Casa Editorial Saturnino Calleja Fernández, Madrid [1912?]. 9 x 6 inches.

[Crude maps, politically colored, which exhibit a total ignorance of the relation of scale to the importance of the region represented. Into the Procrustean bed of the space unit available are forced alike such incommensurate areas as a province of Chile and the continent of Africa. Even the political unit does not seem entirely safe from sacrilege, as witness the map of the United States (Lám. 72), on which the Empire State seems to consist of an eastern half, "Vermont," and a western, "Albani" and Missouri has been entirely eliminated, its territory being divided between Louisiana and Arkansas—or the map of "Hottentocia" (Lám. 66) in which even Germans might have difficulty in recognizing a likeness to their Southwest African colony. Nevertheless, some of the maps of Spain, for instance those showing ecclesiastical, judiciary, university, military and naval subdivisions, density of population and railroads, are not devoid of interest.]

Calendario-Atlante De Agostini. Anno X. By Dr. A. Machetto. 141 pp. 24 plates, text (101 pp.) and index (29 pp.). Istituto Geografico De Agostini, Novara, 1913. Price, Lire 1. 6 x 3.

[Vest-pocket atlas, costing only 20 cents, with excellent political maps, naturally on a relatively small scale (countries of Europe, 1:10,000,000; the other continents are each represented on a single map, 1:100,000,000; Lybia, however, and Eritrea, Italian Somaliland and Abyssinia, 1:20,000,000. The maps are of the high quality which has made the Istituto Geografico De Agostini the foremost private map publishing firm in Italy.]

Atlas de Poche contenant 68 cartes en couleurs, un texte géographique et statistique [17 pp.] et un index alphabétique [45 pp.] des noms contenus dans l'atlas avec renvoi aux cartes. Nouvelle édition corrigée. [Par] F. Schrader. Hachette et Cie, Paris [1912?]. 3.50 frs. 8 x 5 inches.

[May best be characterized as the French analogy of Perthes's Taschen-Atlas. While very serviceable it does not equal its German counterpart in technique: relief, which is in brown hachuring, tends to have a smudged appearance and the colors often do not register well. Political maps naturally prevail, with emphasis on France and its colonies, the former being represented by a hypsometrical map (1:7,000,000), several general maps (rainfall, population density and military, ecclesiastical, judiciary, and university divisions, 1:15,000,000) and a detailed map, 1:3,500,000; the latter *e. g.* by Algeria and Tunisia, 1:7,000,000, Indo-China, 1:16,000,000, etc.]

Fellows and friends of the Society who do not preserve the files of THE BULLETIN will confer a favor if they will kindly return to the Society the number for April, 1913, our edition of which is exhausted.

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